

# **The California Environmental Protection Agency's**

## **Children's Environmental Health Program**

### **Biennial Report for 2002 - 2003**

A Report to the Governor and Legislature on Implementation of the  
Children's Environmental Health Initiative, including  
the Requirements of Chapter 731, Statutes of 1999, and  
the Requirements of Chapter 144, Statutes of 2000

Submitted by the  
Children's Environmental Health Center  
Office of the Secretary, Cal/EPA

January 1, 2004



*Protecting and improving children's health is a priority for Governor Arnold Schwarzenegger. The California Environmental Protection Agency is committed to improving both the outdoor and indoor environment where children play and go to school. This second biennial report highlights the accomplishments of Cal/EPA programs focused on improving air quality, assessing and reducing environmental risks, and improving the classroom and school environment. The accomplishments are laudable. The goals we have set for the next few years are high and the tasks more difficult. Working with our partners in other branches of government and community-based organizations, we will meet the challenge. It is true that "our children are our future." Soon, they will become the custodians of our environment, we must teach them well.*

***Terry Tamminen***  
***Secretary for Environmental Protection***

**STATE OF CALIFORNIA**  
**Arnold Schwarzenegger**  
**Governor**

The California Environmental Protection Agency's Children's Environmental Health Center, its Boards, Departments and Office are pleased to report our progress in implementing California's landmark legislation to protect and improve children's environmental health. The contributors to this report continue to demonstrate both their professionalism and passion to improve California's environment and make it healthier for our children. We gratefully acknowledge the encouragement and support of our leaders and partners in the progress that has been made to date. We look forward to the challenges that lie ahead and the achievements we can make together. "We do not own the environment, we borrow it from our children." Let's return it better than we found it.

***William A. Vance, Ph.D.***  
***Assistant Secretary for Children's Environmental Health***



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## Executive Summary

The Children's Environmental Health Protection Act of 1999 was landmark legislation introduced by Senator Martha Escutia in Senate Bill 25 (Chapter 731, Statutes of 1999). Assembly Bill 2872 introduced by Assemblyman Kevin Shelley codified (Chapter 144, Statutes of 2000) the Administration's and the Legislature's environmental health programs. There are two major themes in California's programs to protect children's environmental health. One theme focuses on exposures to environmental contaminants that occur outdoors, also referred to as "ambient" exposures, while the other focuses on schools and the classroom indoor air environment. These two key pieces of legislation, as implemented by the California Environmental Protection Agency (Cal/EPA) and its boards, departments, and offices, provide California one of the strongest children's environmental health programs in the nation.

A long-held principle in environmental health policy has been the protection of members of the population that are most susceptible to the adverse effects of environmental hazards. By doing so, we ensure the protection of our larger society. Children may be more vulnerable to environmental contaminants than adults – primarily because of the biological susceptibility of their developing organ systems to chemical insults and the relatively greater doses received by children than adults from exposure to the same concentrations of environmental contaminants. In this spirit, the Children's Environmental Health Protection Act requires that each of California's Ambient Air Quality Standards be re-evaluated to ensure that they are health protective of the most sensitive members of the population, including infants and children. The Act also requires that the State's list of Toxic Air Contaminants be reviewed to identify those contaminants that might cause infants and children to be especially susceptible to illness and to then institute Air Toxic Control Measures (ATCMs) needed to reduce exposures. There are many other elements to the Children's Environmental Health Program that are described in this report.

The Children's Environmental Health Protection Act created within Cal/EPA the Children's Environmental Health Center (CEHC) and charged it with providing overall leadership on matters related to protecting the State's children from environmental hazards, with special emphasis on air pollution. It also specified tasks to be accomplished by the Center in collaboration with the Air Resources Board and the Office of Environmental Health Hazard Assessment. A key responsibility of the CEHC, stipulated by Sec. 900 (d) of Part 3 of Division 1 of the Health and Safety Code (HSC), is to report to the Governor and Legislature on the accomplishments related to protecting children's health under the mandates of the Children's Environmental Health Protection Act. The HSC also requires the CEHC to report to the Governor and the Legislature on the implementation of Sec. 901 (the Children's Environmental Health Initiative) as part of the report on implementation of the Children's Environmental Health Protection Act. Within Cal/EPA there are six boards, departments and offices that implement the Children's Environmental Health Program (SB 25 and AB 2872) from a cross-media perspective. This combined report is submitted by the CEHC in fulfillment of the biennial reporting requirement.

This report is comprised of an executive summary and five chapters. Chapter I presents updates on the implementation of SB 25, Chapter II focuses on the elements of the state's programs contained

in AB 2872, and Chapter III provides a synopsis of a number of State-sponsored children's environmental health studies. Chapters I through III are each formed from a compendium of reports, prepared by the various Cal/EPA boards, departments, and offices in collaboration with the CEHC. Chapter IV reports on the activities of the CEHC since January 2002. Chapter V includes, for reference, copies of the legislation creating the CEHC and the mandates to each of the boards, departments and offices responsible for implementing the Children's Environmental Health Protection Act, and a list of acronyms. The Executive Summary only highlights the statutory requirements and accomplishments of Cal/EPA's children's environmental health programs; the reader is encouraged to read each board, department, or office's summary of their accomplishments for the second two years (2002 – 2003) and their goals for the next two years (2004 – 2005).

## **Sec. I Implementation of Ch. 731, Statutes of 1999 (SB 25)**

### **Review of California's Ambient Air Quality Standards for Criteria Air Pollutants**

The Children's Environmental Health Protection Act required the California Air Resources Board (ARB), in consultation with the Office of Environmental Health Hazard Assessment (OEHHHA or Office), to review all health-based California Ambient Air Quality Standards (CAAQS) by December 31, 2000. California has established 15 ambient air quality standards for 10 criteria air pollutants (some pollutants have multiple standards for long-term and short-term effects). The purpose of the review was to determine whether the standards, based on public health, scientific literature, and exposure pattern data, adequately protect the health of the public, including infants and children, with an adequate margin of safety. HSC § 39606(b) requires the Office of Environmental Health Hazard Assessment, when making recommendations to the Air Resources Board on the health-based CAAQS for the eight Criteria Air Pollutants (CAPs), to assess to the extent that information is available: (1) exposure patterns among infants and children that are likely to result in disproportionately high exposure to ambient air pollutants in comparison to the general population; (2) special susceptibility of infants and children to ambient air pollutants; (3) the effects on infants and children of exposure to ambient air pollutants and other substances that have a common mechanism of toxicity; and (4) the interaction of multiple air pollutants on infants and children, including the interaction between criteria air pollutants and toxic air contaminants (TACs).

In December 2000, the ARB approved the staff report on the review of the health-based CAAQS ("Adequacy of California Ambient Air Quality Standards: Children's Environmental Health Protection Act"). The review of the criteria air pollutants and associated CAAQS indicated that adverse health effects may occur in infants, children, and other potentially susceptible subgroups exposed to pollutants at or near levels corresponding to several of the California AAQS. The pollutants were placed into two tiers, with the first representing greater potential risks to public health at current ambient air concentrations or the current air quality standards. The first tier includes particulate material less than 10 micrometers (microns) in aerodynamic diameter (PM<sub>10</sub>), sulfate (as a subset of PM), ozone (O<sub>3</sub>), and nitrogen dioxide (NO<sub>2</sub>).

Based on the findings of the December 2000 Review Report, ARB staff, in consultation with OEHHHA staff, conducted an intense review of the scientific literature on the health effects of particulate air pollution. PM<sub>10</sub> is a heterogeneous mix consisting of both fine particles (PM<sub>2.5</sub> or particles 2.5 microns in diameter or less) and coarse particles (2.5 to 10 microns in diameter). Fine particles

primarily result from fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces and wood stoves, and agricultural burning. Coarse particles generally emanate from sources such as windblown dust, unpaved roads, materials handling, and crushing and grinding operations. The PM<sub>10</sub> 24-hour standard of 50 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) is often exceeded throughout the State. A large body of epidemiological studies indicates an association between current ambient concentrations of PM<sub>10</sub> and a suite of adverse outcomes including changes in lung function, respiratory symptoms, asthma exacerbation, doctor visits, emergency room visits, hospital admissions, and mortality. The more severe outcomes are experienced primarily by the elderly and by people with pre-existing chronic heart or lung disease. However, several epidemiological studies suggest that children under age five, and possibly under age one, may also experience severe adverse responses from exposure to PM<sub>10</sub>. Studies have found associations between PM<sub>10</sub> and changes in lung function, asthma, respiratory symptoms, doctor visits, and mortality in this subgroup.

A staff report titled "Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates" released in May 3, 2002, discusses the health effects of exposure to particulate matter, including effects on sensitive populations such as children and the elderly. It found that studies have consistently reported associations between PM<sub>10</sub> and several different measures of hospitalization or urgent care for respiratory diseases. The causes for hospitalization for respiratory disease include chronic obstructive pulmonary disease, asthma, and pneumonia. In addition, associations have been reported between PM<sub>10</sub> and the need for urgent care including hospital emergency room visits, doctor visits, and public clinic visits. These effects have been reported among all age groups, including children. The evidence of studies discussed in the report suggests that exposures to PM may have a disproportionate effect on children, infants and the elderly. The report recommended lowering the annual-average PM<sub>10</sub> ambient air quality standard to 20 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), down from 30  $\mu\text{g}/\text{m}^3$ , and establishing a new annual-average PM<sub>2.5</sub> ambient air quality standard of 12  $\mu\text{g}/\text{m}^3$ . The report recommends maintaining the sulfates standard of 25  $\mu\text{g}/\text{m}^3$  and updating the monitoring methods. Following public comment and workshops, the Board adopted the recommended standards, which became effective on July 5, 2003. Staff will re-evaluate the scientific literature pertaining to 24-hour PM standards for PM<sub>2.5</sub> and PM<sub>10</sub> in the future.

Ozone is the second criteria air pollutant that is undergoing extensive review for possible revision of the CAAQS. Ozone is an important component of smog formed by the interaction of sunlight, nitrogen oxides and hydrocarbons in the air. It is a respiratory irritant and has been associated in a number of studies with exacerbation of asthma, decreased lung function measured in both children and adults, and possibly impacts on lung function development in children. The scientific literature on ozone indicates the potential for biologically significant effects when exposure concentrations are at or below the current State standard of 0.09 parts per million (ppm) (1-hr average). Several factors may render children and young adolescents more susceptible to ozone exposure, including activity and exposure patterns, higher doses per unit of body weight and lung surface area, and the potential for effects on lung growth and development. A large fraction of California's population resides in areas in which ozone concentrations occur at or above the current State standard, primarily during daylight hours in the summer. Recommendations on the current CAAQS for ozone should come before the ARB in 2004.

The third criteria air pollutant prioritized for review is NO<sub>2</sub>. Nitrogen dioxide is formed during combustion of automotive fuel, natural gas, and other materials. Nitrogen dioxide has been shown to exacerbate asthma and irritate the respiratory tract and eyes. However, recent studies suggest that exposure to NO<sub>2</sub> at concentrations only slightly above the current state one-hour standard of 0.25 ppm sensitizes bronchial or airway responses to challenge with common aeroallergens (e.g., pollen grains and mold spores) in subjects with allergic asthma. Though recent trends suggest nearly complete statewide compliance with the current AAQS, recent clinical and epidemiological studies suggest examination of the basis for the standard is warranted. The review will begin in 2003 and should come before the Board in 2004.

The second tier of criteria air pollutants whose ambient air quality standards will be considered beginning in 2005 include lead, carbon monoxide, hydrogen sulfide, and sulfur dioxide. While these chemicals can have adverse health effects in children, on a statewide basis, exposures were considered either very limited or less threatening than for chemicals in the first tier.

### **Evaluating the Adequacy of California's Air Monitoring Network**

California's extensive statewide ambient air quality monitoring network, which is also part of a nationwide network of monitors, was designed to measure regional levels of pollutant concentrations in the outdoor air. The primary purpose of the statewide network is to determine which areas of the State are in attainment or not in attainment (non-attainment) with health-based State and federal air quality standards. The statewide network also provides the data required for identifying and evaluating locations in the State where there may be high levels of toxic air contaminants (TAC). The information provided by the statewide network helps determine which air pollution control programs and strategies are needed, and to evaluate the effectiveness of air pollution reduction programs.

The statewide ambient air-monitoring network has been most useful in assessing regional levels of air pollution in California. However, the network may not in all cases adequately represent specific locations, outdoors or indoors, where children spend time and where they are potentially exposed to harmful air pollution. Because there is incomplete information on exposures infants and children might experience, it is difficult to adequately assess the potential health impacts of air pollution. As part of the effort to meet the California Children's Environmental Health Protection Act's goal of ensuring the State's air quality standards and airborne toxic control measures adequately protect the health of infants and children, the Act required the ARB to:

- Evaluate the adequacy of the current outdoor air quality monitoring network for its ability to gather the data necessary to determine the exposure of infants and children to air pollutants including criteria air pollutants and toxic air contaminants.
- Identify areas where the exposure of infants and children to air pollutants is not adequately measured by the current monitoring network.
- Recommend changes to improve air pollution monitoring networks and data collection to more accurately reflect the exposure of infants and children to air pollutants.



The Act stipulated that, for the purpose of sampling air pollution in locations where children spend time, the ARB, in cooperation with local air quality districts, was to expand its existing monitoring program to include six communities in non-attainment areas around the state. It specified that the expansion include:

- Special monitoring of children's exposure to air pollutants and toxic air contaminants.
- Placement of air pollution monitors near schools, daycare centers, and outdoor recreational facilities that are in close proximity to, or downwind from, major industrial sources of air pollutants and toxic air contaminants, including, freeways and major traffic areas.
- Monitoring during multiple seasons and at multiple locations within each community at schools, daycare centers, recreational facilities, and other locations where children spend most of their time.
- A combination of approaches to provide the most comprehensive data possible on the levels of children's exposure to air pollutants and toxic air contaminants. These approaches include: upgrades to existing fixed (i.e., not mobile) monitoring sites, establishment of new fixed monitoring sites, conducting indoor/outdoor air sampling, and personal exposure measurements in each community.

The ARB identified six communities and the locations within those communities at which to monitor. The communities chosen include Barrio Logan (San Diego); Boyle Heights (Los Angeles); Wilmington (Los Angeles); Fruitvale (Oakland); Crockett; and Fresno. These six areas exemplify the diversity of weather, geography and air pollution sources present in California where emissions from diesel exhaust, automobiles, neighborhood sources, refineries and marine sources can affect air quality. Fresno is part of an ongoing monitoring program associated with the Fresno Asthmatic Children's Environment Study (FACES). (See below and Section III-C for further information on FACES.) Monitoring in each of the six communities has been completed. Specific details regarding each community, including the monitoring efforts, are provided in Section I-B-1 of this report. The Bay Area Air Quality Management District (BAAQMD) and the South Coast Air Quality Management District collaborated with the ARB in some of these monitoring efforts.

The six sites were selected with an expectation that higher levels of localized pollution would be found when compared to the nearby regional monitoring sites. This expectation was based on selecting monitoring locations downwind of areas with relatively high densities of emission sources. The strategy was to maximize the possibility of finding exposure differences between individual communities and typical regional exposures. In general, however, it was found that levels of air pollution at the six selected sites were quite similar to the levels found at the nearby network regional monitors. The exceptions were those areas within a community with near-source emissions. It was recognized from the outset that such localized areas of higher pollution levels could exist if they were in close proximity to one or more air pollution sources.

In evaluating the statewide regional monitoring network, the monitoring results from the six selected sites were compared with the regional network data. The purpose of this analysis was to determine how well the network monitoring data represents exposures in nearby communities. A combination of regional network monitoring data and statistical analyses were used as another method to evaluate the ability of network data to characterize the exposures of children to local air pollution.

Based on these analyses, it was found that the statewide monitoring network provides the fundamental data needed to determine typical outdoor exposures of children to air pollution in California communities. However, it was also found that additional methods are needed to assess localized exposures to children and adults that can result from living, playing or working next to strong emitting sources of air pollutants.

Based on the study results, the ARB developed three recommendations designed to supplement the air pollution exposure information provided by the statewide monitoring network:

- Use mobile monitoring for short-term special purpose assessments to supplement the statewide monitoring data.
- Improve emission estimates and air quality modeling methods to assess localized exposures in close proximity to air pollution sources.
- Under the 2003 Innovative Clean Air Technologies (ICAT) Program, fund development of lower-cost monitoring methods to provide for expanded community level and indoor monitoring.

These recommendations are currently being implemented as part of ARB's community health and environmental justice programs.

In addition to outdoor measurements, indoor air and personal exposure monitoring were conducted inside classrooms during January and June of 2002 in three of the selected SB 25 communities. The University of California, Los Angeles, under contract to the ARB, measured pollutants inside school classrooms, at one outdoor location on the school grounds, and in a nearby residence. Measurements were taken for four weeks at Hollenbeck Middle School in Boyle Heights, six weeks at Wilmington Park Elementary School in Wilmington, and three weeks at John Swett High School in Crockett. Measured pollutants included PM, toxic gases, including formaldehyde and related compounds. A subset of students wore small monitoring devices ("badges") to measure their personal exposure to toxic gases over a 48-hour period. The results of the data analysis were completed in 2003 and a draft final report was prepared. This report is scheduled for reviewed by ARB's Research Screening Committee in February 2004. Preliminary data from measurements taken inside school classrooms and outdoors on the school grounds are consistent with general trends reported in the literature. For example, preliminary data for aldehydes indicate that classroom concentrations tend to be equal to or higher than the corresponding outdoor concentrations at the schools. This generally indicates that, similar to most other indoor environments, there are indoor sources of formaldehyde at the schools (see also Portable Classroom Study Sec II-C-1). Formaldehyde continues to be an air contaminant of concern for both children and adults.

## Review of Toxic Air Contaminants

### *List of Toxic Air Contaminants (TACs) of Concern for Children*

The HSC § 39650 *et seq.* requires the Office of Environmental Health Hazard Assessment to develop a list (the List) of up to five TACs that may cause infants and children to be especially susceptible to illness. The ARB must then review affected ATCMs for these five TACs by July 2003 to ensure they adequately protect infants and children. If there are no existing control measures for

a TAC on the List, the ARB must prepare a “needs assessment” and adopt appropriate control measures by July 2004.

The Office of Environmental Health Hazard Assessment conducted preliminary assessments of all identified TACs (includes about 200 chemicals or chemical classes). Using information on health effects, ambient air concentrations, and emissions sources, 36 TACs were identified and prioritized for focused literature searches. The review of the literature evaluated information on the potential for differential impacts on infants and children as compared to adults. Because children are still developing physiologically, chemicals that affect the nervous system, respiratory system, immune system, endocrine and reproductive organs, and exhibit developmental toxicity would be expected to impact children more than adults. Thus, the TACs that were neurotoxins, endocrine disruptors, immunotoxins, respiratory system toxicants, and developmental toxicants were of most concern during the initial assessment. Exacerbation of asthma was included as a toxicological endpoint of particular concern because asthma surveillance and hospitalization data indicate that children, especially young children, are impacted by asthma illness more than adolescents and adults.

Of the 36 TACs that underwent focused literature reviews, five were listed under the requirements of HSC § 39669.5(a) as possibly causing infants and children to be especially susceptible to illness. These are: polycyclic organic matter (POM) or polycyclic aromatic hydrocarbons (PAHs), lead, polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) (collectively identified as “dioxins”), particulate emissions from diesel-fueled engines, and acrolein. There were four meetings of Cal/EPA’s Scientific Review Panel on Toxic Air Contaminants at which the List of TACs was discussed. The final technical support document (Prioritization of Toxic Air Contaminants under the Children’s Environmental Health Protection Act) discusses the five chemicals (or class of chemicals) on the initial list of TACs. The document also discusses a second list of TACs for which there are concerns about impacts on infants and children. Based on a 1997 health assessment of environmental tobacco smoke (ETS) conducted by OEHHA, the Air Resources Board entered ETS into the formal process for identification as a TAC. The 1997 health assessment was updated by OEHHA based on children’s exposure patterns and using the most recent information on the health effects of ETS on infants’ and children’s respiratory systems.

### *Review of Air Toxics Control Measures (ATCMs)*

The HSC § 39669.5(b) requires the ARB to review and revise any control measure adopted for the TACs on the List established by OEHHA within two years (by July 2003). The goal of the air toxics program is to reduce to the maximum extent feasible, or eliminate when possible, exposures to toxic air pollutants to all Californians, including infants and children. For any TAC on the List for which there are no existing control measures, the statutes require the ARB to prepare a needs assessment report and adopt control measures, as appropriate, within three years (by July 2004). As noted above, to date, the five TACs included on the List for which these actions must be taken are: acrolein, particulate matter from diesel-fueled engines (diesel PM), dioxins, lead, and POM or PAHs.

The ARB adopted two new ATCMs and considered two additional ATCMs for adoption to reduce exposures for diesel PM during the period 2002 to 2003. Reducing levels of diesel PM is a priority of the ARB not only because it may cause infants and children to be more susceptible to illness, but it is also estimated to contribute about 70 percent of the potential cancer risk from air toxics statewide.

ARB's September 2000 needs assessment report, *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*, outlines control measures to be developed over the next several years. The goal is to reduce diesel PM emissions 75% by 2010 and 85% by 2020. The Board adopted regulations establishing new heavy-duty diesel engine standards and the reduction of emissions from public transit buses. The Board has also adopted or considered four ATCMs to reduce emissions of diesel PM that include the following:

- A School Bus Idling ATCM that requires a driver of a school bus or vehicle, transit bus, or other commercial motor vehicle to manually turn off the bus or vehicle engine upon arriving at a school and to restart no more than 30 seconds before departing. A driver of a school bus or vehicle is subject to the same requirement when operating within 100 feet of a school and is prohibited from idling more than five minutes at each stop beyond schools, such as parking or maintenance facilities, school bus stops, or school activity destinations.
- A Solid Waste Collection Vehicle ATCM designed to reduce emissions from 1960 to 2006 model year diesel-fueled engines in residential and commercial solid waste collection vehicles. These vehicles must use new low emissions engines or retrofit existing engines to meet a 0.01 gram per brake horsepower-hour particulate matter standard. Other compliance options are available.
- A Stationary Diesel Engine ATCM that limits emissions of diesel PM from new and existing stationary diesel-fueled compression ignition (CI) engines. The proposed control measure establishes emission standards, including a standard for diesel PM emissions, that sellers of stationary diesel-fueled engines would have to meet. The goal of the requirements is to have the owners and operators of diesel-fueled engines use the cleanest fuels possible, limit the unnecessary operation of their engines, and control the emissions of diesel PM to the greatest extent possible.
- A Transport Refrigeration Unit (TRU) ATCM. TRUs are used in semi-trailer vans and trucks that transport food and other perishable items. The vans and trucks carrying a TRU can be found in large numbers at distribution facilities that are often located in urban and residential areas where children live and play. The proposed ATCM requires in-use TRU engines operating in California to meet specific performance standards for two engine size categories. The in-use performance standards will be phased-in beginning in 2008 (the low emission TRU performance standards) and 2010 (the ultra-low emission TRU performance standards).

Other ATCMs that were reviewed by ARB, but did not require revision, included:

- Of the five TACs listed as making children more susceptible to illness, the ARB has airborne toxic control measures for two, lead and dioxins, that were reviewed in 2003. These were reviewed pursuant to the requirements of Senate Bill 25 to ensure they continued to provide public health protection, especially for infants and children.
- The 1990 Airborne Toxic Control Measure (ATCM) for Dioxins from Medical Waste Incinerators requires 99% control of dioxin emissions from medical waste incinerators burning more than 25 tons per year. After a comprehensive review of the medical waste incinerator industry and

consulting with the California State Department of Health Services, the ARB staff recommended that no revisions of this ATCM were necessary.

- The 1993 Airborne Toxic Control Measure for Toxic Metals from Non-Ferrous Metal Melting requires certain non-ferrous metal melting facilities to reduce emissions of toxic metals, including lead, arsenic, cadmium and nickel. After reviewing the list of statewide facilities, conducting a survey to determine the amount of lead melted at each facility, assessing existing control equipment, and performing an exposure and risk analysis, the ARB staff recommended that no revisions to the ATCM were necessary.

The remaining two of the five TACs on OEHHA's List do not have control measures. Therefore, the ARB is required to prepare a needs assessment report and adopt control measures, as appropriate, by July 2004 for acrolein and polycyclic organic matter (POM) or polycyclic aromatic hydrocarbons (PAHs). These needs assessment reports are currently under development.

## **Sec. II California's Children's Environmental Health Initiative**

### **Cancer Risk Assessment for Children**

The HSC § 901 (d)(1) requires the Office of Environmental Health Hazard Assessment (OEHHA or Office) to develop criteria for identifying carcinogens likely to have greater impact if exposures occur early in life. The Office has developed an initial version of criteria for determining carcinogens that might have greater impact if exposure occurs early in life. The Office is also required to assess methodologies used in existing guidelines to address early-in-life exposures (HSC § 901 (d)(2)). The Office has evaluated current federal and state cancer guidelines used to estimate excess cancer risk and has determined that they do not use methodologies or mathematical models that address early-in-life exposures. Such methodologies and models remain to be developed. In addition, OEHHA is required to construct a database of animal studies to evaluate increases in risks from short-term early-in-life exposures (HSC § 901 (d)(3)). Two databases have been constructed to evaluate increased risk from early-in-life exposures. The first was developed by OEHHA and contains over 1,000 individual studies identified as potentially providing adequate data for comparison of cancer risk following administration of carcinogenic agents at different time periods, e.g., prenatal and perinatal, childhood, and adulthood. The second database prepared under contract to OEHHA contains approximately 5,500 studies involving about 800 chemicals from 2,000 scientific journal articles that will allow evaluation of a large number of parameters that may affect tumorigenesis. Finally, the Office is required to complete and publish children's cancer guidelines that shall be protective of children's health (HSC § 901 (e)) by July 1, 2004. Efforts are underway to assess and characterize the effects on excess lifetime cancer risk of early-in-life exposures to different carcinogens, but budgetary limitations may not allow completion of the guidelines in 2004.

### **Contaminants of Greatest Potential Health Concern at Schools**

The HSC § 901 required OEHHA, in consultation with the appropriate entities within Cal/EPA, to identify those chemical contaminants commonly found at school sites and determined to be of greatest concern based on criteria that identify (1) child-specific exposures and (2) child-specific

physiological sensitivities. The Office identified two groups of candidate chemicals and created two lists: one for chemicals with the likelihood of occurring at school sites (approximately 200 chemicals) and the other for chemicals having the potential to cause adverse effects in school-age children (approximately 190 chemicals). These are "working" compilations of chemicals that serve to direct data-gathering and in-depth literature reviews to facilitate ongoing prioritization of chemicals for development of numerical health-based values. The compilations are available at OEHHA's web site.

The HSC § 901(g) stipulates that by December 31, 2002, and annually thereafter, OEHHA shall publish and make available to the public and others, as specified, numerical health-based guidance for five chemicals from the list of chemical contaminants commonly found at school sites and determined to be of greatest concern until the list is exhausted. Accordingly, OEHHA developed child-specific reference doses for cadmium, chlordane, heptachlor/heptachlor-epoxide, methoxychlor, and nickel. The supporting documentation for the health-based numbers for these five chemicals is available at OEHHA's web site.

## **Children's Environmental Exposure Studies**

### ***Portable Classroom Study***

Across the State, the installation of portable classrooms has provided a relatively efficient solution to classroom overcrowding. However, there have been reported environmental problems in some of these classrooms, including formaldehyde, mold, and ventilation problems. Chapter 144, Statutes of 2000 (AB 2872) and HSC § 39619.6 required the ARB and the California Department of Health Services (DHS) to evaluate conditions in California's classrooms. The joint study was conducted in two phases: questionnaires were mailed to teachers and facility managers at over 1,000 schools statewide, and detailed on-site measurements of a variety of environmental factors were obtained at 201 classrooms in 67 schools statewide. The fieldwork was conducted by a contractor, Research Triangle Institute. Public workshops and meetings with key state agencies were held before and after the study was conducted. Staff also met individually with some school district personnel and portable classroom manufacturers.

The ARB and DHS completed their report to the Legislature in 2003. The study identified a number of environmental health problems in both portable and traditional (site-built) classrooms that need improvement, including inadequate ventilation, elevated air pollutant levels, excess noise, moisture and mold problems, and lack of maintenance. A small fraction of the classrooms had severe problems. Some of the specific findings include:

- Inadequate outdoor air ventilation and poor system maintenance in many classrooms.
- Background noise above current guideline levels in all classrooms.
- Indoor levels of formaldehyde exceeding OEHHA's guideline levels, and the one-in-a million excess cancer risk level, in nearly all classrooms.
- Elevated levels of lead and arsenic in the floor dust of some classrooms.
- Residues of numerous pesticides in the floor dust of many classrooms.
- Visible mold or evidence of moisture problems (e.g., high moisture content in the building materials, or water stains) in about one-third of the classrooms.

- Temperature and humidity levels outside the acceptable range in some classrooms.
- Inadequate lighting in some classrooms.

Most, but not all, of these problems were found more often in portable classrooms than in traditional classrooms. Sixteen recommendations are included in the report to address these problem areas.

### *School Bus Study*

The Children's School Bus Exposure Study is a comprehensive study of children's exposures during school bus commutes. It was funded by the Air Resources Board and conducted by researchers at the University of California, Riverside and Los Angeles campuses. Its purpose was to determine the extent of children's exposures, with an emphasis on those conditions potentially leading to high exposures, and to determine the factors most important in producing high exposures. Real-time and time-integrated measurements of pollutant concentrations were conducted inside five conventional diesel school buses as well as a diesel bus outfitted with a particulate trap and a bus powered by natural gas (seven buses total). Measurements were made on actual bus routes in Los Angeles, including at bus stops and at school loading zones.

Major findings of the study included:

- Exposures to diesel-vehicle related pollutants (DRPs) inside conventional (uncontrolled) diesel school buses were significantly higher than outside roadway pollutant concentrations alone would indicate. This was largely due to "self pollution," or the intrusion of the bus' own exhaust into the cabin after leaving the exhaust pipe. The effect was worse when the windows were closed and worse for older buses. DRPs on uncontrolled diesel buses were up to 2.5-fold higher when windows were closed.
- The influence of other traffic was also a key determinant of exposure. With the windows open, DRP concentrations were two to three times higher when traveling on the congested urban route compared to the less congested suburban/rural route.
- Less polluting buses showed lower exposures. The CNG-powered bus and the particulate trap-equipped bus showed significantly reduced on-board concentrations of DRPs compared to conventional diesel buses. With the windows closed, the DRP concentrations were two- to five-fold higher on conventional diesel buses compared to the cleaner buses.
- Almost all exposures occurred while commuting on the bus and not during the relatively short times spent boarding and de-boarding the bus.

The complete report with all recommendations can be found at ARB's website at:  
<http://www.arb.ca.gov/research/schoolbus/schoolbus.htm>.

### *Playground and Track Surfacing Materials*

Resolution 2003-359, California Integrated Waste Management Board (CIWMB), "*Evaluation of the Health Affects of Recycled Waste Tires in Playground and Track Products*" funded an independent review by the Office of Environmental Health Hazard Assessment (OEHHA) to answer safety and toxicological questions that arose from the use of recycled waste tires in playground structures and surfaces. Parents remain concerned about potential hazards at playgrounds since each year

thousands of California children are injured on playgrounds to the degree that they require a hospital visit. There is also concern about the widespread use of wooden playground equipment treated with wood preservatives, such as copper-chromate-arsenic (CCA), which contains a known carcinogen.

Under contract to the CIWMB, OEHHA initiated a review of the scientific and technical literature. OEHHA conducted a data call-in for all of published information regarding the chemical content and degradation products of recycled tires. OEHHA contacted the recycled tire association and manufacturers to obtain unpublished information that describes the chemical content of tires to which children might be exposed from their use in playground materials. From this information, OEHHA is developing a report and will formulate a laboratory analytic plan to address issues of children's potential exposures from playing on structures having recycled tire content. CIWMB will also sponsor laboratory and field studies and a dermal and inhalation exposure assessment from use of recycled tire materials in playground equipment.

## School Site Programs

### *School Site Multimedia Exposure and Health Risk Assessment*

The HSC § 901(f)(1) requires the Office of Environmental Health Hazard Assessment to publish a guidance document, for use by DTSC and other state and local environmental and public health agencies to assess exposures and health risks at existing and proposed school sites on or before December 31, 2002. In collaboration with the Department of Toxic Substances Control, OEHHA developed draft guidance for multimedia, multi-pathway, risk assessment for existing and proposed school sites (Guidance). The Guidance has been through external peer review and public review and comment. The equations in the Guidance have been incorporated into an Excel® spreadsheet that will facilitate compliance with the Guidance.

The school environment is a unique exposure setting, which requires an additional set of exposure parameters. For example, the ages and activity patterns of the people who attend and work at schools may differ from other typical occupational or residential settings. Exposure pathways and scenarios at schools are a subset of the pathways operating in other settings. The draft guidance considers exposures that could occur from these sources:

- Children can be directly and indirectly exposed at school to contaminants originating in soil. Vapors emitted from contaminated soil at the school site can be inhaled indoors and outdoors.
- Children can be exposed to soil contaminants by direct contact with contaminated outdoor soil or with soil particles transported into school buildings via of aerosols or by tracking of soil particles into buildings on shoes, clothing, play equipment and other sources.
- Soil particles can be entrained into aerosols that can be inhaled indoors and outdoors.
- Contaminated shallow aquifers underneath school property can release volatile chemicals into the air.

When final, the guidelines can be used to assess chemical exposure and risk at existing and proposed school sites. Their widespread use in a uniform manner will be facilitated by the availability of an easy-to-use Excel spreadsheet.



The Office is developing a framework for a multimedia, multi-pathway risk assessment (MMRA) for use within Cal/EPA. From among the many exposure pathways encompassed by the MMRA framework, those that are relevant to a school setting will be selected for incorporation into a school exposure scenario. The Office will further develop this into a specific mathematical model to assess exposures to children while at school.

### *Evaluating Risks at School Properties*

Assembly Bill 387 and Senate Bill 162 passed into law on January 1, 2000 require the Department of Toxic Substances Control (DTSC) to participate in the environmental review process for the proposed acquisition of and/or construction on school properties, including expansions and additions, where state funding is utilized. The legislation also expanded DTSC's authority to evaluate naturally occurring hazards, such as petroleum deposits and naturally occurring asbestos in serpentine rock formations. In response, DTSC implemented a specific program, the School Property Evaluation and Cleanup Division (Schools Program), to provide the regulatory process for review of school sites. DTSC has reviewed over 1,330 school projects since the legislation was implemented in January 2000. Since January 2002, DTSC has reviewed 523 school projects. During calendar years 2002 and 2003, about 46% of the review projects went through a Phase I Assessment, while about 42% went through a Preliminary Environmental Assessment (PEA). Eleven percent of the school sites reviewed required removal actions.

DTSC is currently developing the School Evaluation and Assessment Manual (SEAM) which will be a comprehensive approach for the environmental evaluation of school sites. The SEAM will include the Phase I, Phase I Addendum, a revised and updated Preliminary Environmental Assessment, Supplemental Site Investigation protocol, and an outline of the Removal Action Workplan process. In addition, the SEAM will have a section on addressing the tiered approach for evaluating existing school sites.

Effective February 11, 2003, new regulations developed by the DTSC's Schools Division were adopted into Title 22, California Code of Regulations, pursuant to Education Code Section 17210(g). These regulations establish guidelines for completing Phase I Environmental Site Assessments at proposed school sites under the Education Code to streamline the environmental review process. The regulations also provide procedures for submission of sampling and analysis results in Phase I or Phase I Addendum reports for lead in soil from lead-based paint and/or PCBs in soil from electrical transformers. The regulations were implemented by the Schools Division and school districts.

Using funds available through U.S. EPA's Preliminary Assessment/Site Inspection Grant Program, the DTSC completed Preliminary Environmental Assessments for five proposed school sites. The DTSC's pilot program benefited these school districts in several ways. The pilot program assisted financial hardship school districts that otherwise would not have been able to evaluate these sites. In addition, it demonstrated that through direct contractor oversight, the DTSC can assist school districts in controlling investigation costs and improving project efficiency.

A significant finding by the DTSC remains the potential problem of hazardous material contamination at existing school properties. For example, the DTSC investigated eight existing schools where several of them were determined to need soil remediation or removal. Considering that there are over 8,000 schools in California, most of them located in large cities with some of them built 30 to 40 years ago, there may be a significant number requiring some form of cleanup. However, unless an existing school is proposing new construction, there is no current mandate requiring a systematic environmental review of these schools. One outcome of the DTSC's environmental overview has been the motivation of school districts to become more selective in evaluating potential school properties; and, it has enabled community members and parents to have a more active participatory role in selection of school properties.

### ***Building Materials Emissions Study***

In March 2001, the CIWMB initiated a Building Material Emissions Study to examine the relationship between recycled-content products and their affect on indoor air quality. The focus was on building materials used for permanent and portable classroom construction in California, materials specific to state construction, and tire-derived resilient flooring products. Another purpose of this study was to compare chemical emissions of alternative products to standard or commonly used building materials. Alternative products not only included recycled content, but also products that were rapidly renewable or marketed as containing non- or low-volatile organic compounds (VOCs). Lastly, the study evaluated whether standard and alternative products would meet low-emitting indoor air quality criteria, established in the construction specifications found in Section 01350 of the *Special Environmental Requirements* for classrooms and state projects.

The Building Material Emissions Study was completed in 2003. This study demonstrated that there are low-emitting recycled content products that can contribute to healthy indoor environments. The study also showed that both alternative and standard products emit chemicals of concern. To the extent that manufacturers continue to test products to assure that they meet Section 01350, more building materials will be acknowledged as environmentally preferable products and contribute to the construction of high performance schools. The full study is available at the CIWMB's website [www.ciwmb.ca.gov/GreenBuilding/](http://www.ciwmb.ca.gov/GreenBuilding/).

### ***Integrated Pest Management at Schools***

The Healthy Schools Act (Chapter 718, Statutes of 2000, AB 2260) put into the Education Code and Food and Agricultural Code (FAC) the Department of Pesticide Regulation's (DPR) voluntary California School Integrated Pest Management (IPM) Program. The Act promotes effective least-hazardous IPM as the State's preferred method of school pest control. It defines this approach as "... a pest management strategy that focuses on long-term prevention or suppression of pest problems through a combination of techniques such as monitoring for pest presence and establishing treatment threshold levels, using non-chemical practices to make the habitat less conducive to pest development, improving sanitation, and employing mechanical and physical controls. Pesticides that pose the least possible hazard and are effective in a manner that minimizes risks to people, property, and the environment, are used only after careful monitoring indicates they are needed" (FAC § 12181-13182).

Through its School IPM Program, DPR is committed to facilitating voluntary establishment of IPM policies and programs in schools throughout California, while assisting school districts with implementation of the new Education Code requirements. The DPR is assisting schools by: establishing an "IPM in Schools" Web site ([www.cdpr.ca.gov](http://www.cdpr.ca.gov), select "School IPM"); identifying and training individuals designated by school districts to carry out school IPM; assisting school districts to establish IPM policies and programs; developing a model IPM program guidebook; and evaluating adoption of IPM in schools.

During 2002-2003, DPR had significant accomplishments that included: developing and conducting a pilot school IPM training workshop attended by 31 school district staff representing 29 districts; conducting four regional school IPM training workshops statewide (Los Angeles, San Diego, Yolo, and Shasta counties) with 100 staff from 79 school districts participating; revising the *California School IPM Guidebook for a Model Integrated Pest Management Program*, available on DPR's website; developing the Health and Environmental LookUP Resource pages (HELPR) that provide information about public health and environmental impacts of pesticides in a user-friendly format that is also available at DPR's school IPM website; DPR conducted a second school survey on pest management practices and policies and published the results in a report entitled "*2002 Integrated Pest Management Survey of California School Districts Summary Report of Findings*," available at DPR's website. Based on the results of the survey, California's public schools appear to be making some progress toward an IPM approach. Generally speaking, larger, urban schools seem to be performing better than rural schools, underlining the need for training in rural areas. DPR finalized its Frequently Asked Questions (FAQ) document and established a list server for timely notification of changes in information. In cooperation with the University of California's statewide IPM Program, DPR began developing an interactive IPM training CD-ROM. This is modeled after a successful UC Master Gardener pilot project and is intended to supplement the training workshops by providing IPM coordinators with an additional tool to use for their localized inter-district training efforts. One of the many benefits of the Healthy Schools Act is the increased information made available to parents and guardians of students and to school staff about the pesticide use at their schools.

### ***Playground Equipment and Surfacing Replacement***

The California Integrated Waste Management Board (CIWMB) administers grant programs directed towards the upgrade and improvement of playground and other recreational facilities where children of all ages spend time. The unique aspect of these programs is that they require fifty percent (50%) of the grant funds allocated to the project be used for the purchase or installation of products made of recycled-content materials.

- *Park Playground Accessibility and Recycling Grant Program (Established by the Safe Neighborhoods, Clean Water, Clean Air, and Coastal Protection Bond Act of 2000).* This Act provides grants to park districts for the purpose of bringing public playgrounds into compliance with State and federal accessibility standards and to satisfy playground safety regulations (HSC § 115725). The Budget Acts for Fiscal Years 2000/2001 and 2001/2002 each included an allocation of \$2.558 million dollars for this program, which will be distributed in two funding cycles. For the first funding cycle, now complete, 56 of 84 submitted applications received passing scores and were awarded a total of \$2,543,100. The second funding cycle is in progress and scheduled to be completed by April 2004.

- *Waste Tire Playground Cover Grant Program and Waste Tire Track and Other Recreational Surfacing Grant Program.* Both of these Programs were initiated by CIWMB as part of their implementation of the Tire Recycling Act (Chapter 974, Statutes of 1989). The CIWMB receives an annual appropriation from the California Tire Recycling Management Fund, a portion of which is allocated to these two Grant Programs. Public entities, including cities, counties, colleges, universities, state owned recreational facilities, public school districts, qualifying California Indian tribes, park districts, and special districts can receive grants. These grants are for the purpose of laying surface materials (including those manufactured from California waste tires): (1) underneath or around playground equipment (Playground Cover Grant Program) or (2) underneath or around recreational sites, defined as an area designed, equipped and set aside for the public's recreation, such as running tracks, tennis courts, skateboard parks, swimming pools, various types of sports fields, weight rooms and fairgrounds (Track and Other Recreational Surfacing Grant Program). For each of five years, through Fiscal Year 2005/2006, \$800,000 and \$1,000,000 have been allocated to the Playground Cover Grant Program and the Track and the Other Recreational Surfacing Grant Program, respectively. Since January 1, 2002, 90 playground cover grants totaling \$2.1 million have been awarded to public entities in California including school districts. Additionally, 47 Track and Other Recreational Surfacing grants totaling \$3.7 million were awarded to public entities, most of them schools districts in California.

Notice of Funding Available for the Track and Other Recreational Surfacing Grant Program for fiscal year 2003/2004 was released in August 2003. CIWMB anticipates awarding successful grantees in March of 2004. In the Board-approved Five-Year Plan, staff proposed funding for the next five fiscal years at \$800,000 per fiscal year for playground cover (with a maximum of \$25,000 per grant) and funding for the next three fiscal years at \$800,000 per fiscal year for track and other recreational surfacing (with a maximum of \$100,000 per grant).

### ***Art Hazards Program***

Education Code (Article 6, § 32060) stipulates that school districts are not to purchase art or craft products containing toxic or carcinogenic substances for use in grades K through 6. Such products can be used in grades 7 through 12 if they are adequately labeled advising the user of the presence of hazardous ingredients, the potential health effects, and instructions for safe use of the art or craft products. OEHHA's Integrated Risk Assessment Section (IRAS) has compiled a list of products that cannot be purchased. The list is updated quarterly. These purchasing guidelines assist both public and private schools in California in ensuring that schoolchildren are not exposed to hazardous substances that may be contained in some art and craft materials.

### ***Lower-Emission School Bus Program***

The purpose of the Lower-Emission School Bus Program is to reduce school children's exposure to both cancer-causing and smog-forming pollution. As approved by the Air Resources Board (ARB) in December 2000, the program was designed to reduce harmful emissions of diesel particulate matter and oxides of nitrogen through two program components:

- A new school bus purchase and infrastructure component to replace pre-1987 model year school buses (which are the oldest, most polluting school buses in California) with new, lower-emitting buses meeting the latest federal motor vehicle safety standards; and
- A retrofit component to equip in-use diesel school buses with ARB-verified exhaust emission control devices that significantly reduce toxic diesel particulate matter.

Through June 30, 2002, the program has been allocated \$66 million. This funding purchased approximately 440 new, lower-emitting school buses. Another 90 new, lower-emitting school buses were purchased with 10% matching funds from the local air districts. All new school buses were delivered to school districts and on the road by late 2002. Funding to continue the Lower-Emission School Bus Program through the 2002 – 2003 and 2003 – 2004 fiscal years was made available through Proposition 40, California's Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act (Public Resources Code section 5096.650). Assembly Bill 425 (Statutes of 2002, Chapter 379) directs that 20 percent of the Proposition 40 funds available to the ARB shall be allocated for the acquisition of "clean, safe, school buses for use in California's public schools that serve pupils in kindergarten and grades 1 to 12, inclusive." For the 2002 – 2003 fiscal year, \$4,920,000 was available for the purchase of new safe, lower-emitting school buses. In the 2003 – 2004 fiscal year, approximately \$4,600,000 will be available for the purchase of new, lower-emitting school buses, pending legislative budget approval. Funds provided for the program through Proposition 40 may not be used for the retrofit program component.

The in-use diesel school bus retrofit component of the program is ongoing. To date, over two-thirds of the \$16,500,000 available for school bus retrofits has been used to equip approximately 1,500 in-use diesel school buses with catalyzed diesel particulate filters that reduce particulate matter emissions by 85 percent. The ARB expects completion of the retrofit component of the program in the spring of 2004. With the remaining funds available for school bus retrofits, approximately 1,500 additional in-use school buses will be equipped with diesel oxidation catalysts (rather than catalyzed diesel particulate filters) that reduce particulate matter emissions by 25 percent.

### **Sec. III Children's Environmental Health Studies**

A number of research studies are in progress that are focused on children's environmental health issues. These projects are sponsored and/or conducted by the ARB or the OEHHA. The highlights of each are presented here.

#### **The Vulnerable Populations Research Program**

The Vulnerable Populations Research Program (VPRP) was authorized by the California Legislature and the Governor in July 1999. The purpose of the program is to provide scientific support, through research efforts, to ARB's regulatory and non-regulatory programs that aim to protect all Californians, especially those subpopulations considered most vulnerable to the adverse health effects of air pollution. Research conducted under the VPRP plan will identify susceptible subpopulations, quantify the degree to which their health is compromised, and will characterize their exposures to air pollutants. Historically, research efforts designed to fill gaps on air pollution impacts on the most vulnerable members of society have focused on children, the elderly, people with pre-

existing cardiovascular and/or pulmonary disease, and individuals who spend a large amount of time out-of-doors. Recent actions taken to address the requirements of SB 25 add emphasis to the need to study children's health. The August 2003 VPRP progress report and research plan identifies eight broad research questions that address health and exposure data gaps in vulnerable populations where children are a main focus. The VPRP progress report is available at ARB's website at: <http://www.arb.ca.gov/research/vprp/vprp.htm>.

### ***Southern California Children's Health Study***

The Southern California Children's Health Study (CHS) was initiated in 1991 under the auspices of the ARB's Long-term Exposure Health Effects Research Program. This ten-year study is the first major study of the health effects of children's long-term exposures to southern California's high concentrations and unique mixtures of air pollutants. The study is being conducted by a multi-disciplinary research team centered at the University of Southern California and focuses on three criteria air pollutants: ozone, nitrogen dioxide, and PM<sub>10</sub>; and the aggregate vapor phase concentrations of nitric, acetic, and formic acids.

The Children's Health Study has yielded many important results. For example, children living in communities with higher concentrations of nitrogen dioxide, particulate matter, and acid vapor have been shown to have lower rates of lung function growth. For children, the rate of growth in lung function was reduced when they moved from less polluted communities to communities with higher PM<sub>10</sub>. Conversely, an improvement was seen in the rate of lung function growth in children who moved from the more polluted communities to communities of lower PM<sub>10</sub>. However, a long-term consequence of deficits in lung growth and development in children may be poorer respiratory health during adulthood. School absence rates increased with daily variations in ozone levels, especially in communities with low PM<sub>10</sub> and nitrogen dioxide. Asthmatic children had more bronchitis if they lived in communities with more nitrogen dioxide or particulate pollution. Children who played three or more team sports and spent more time outside in high ozone communities had a higher incidence of newly diagnosed asthma indicating a possible causal link between ozone and asthma. This information will be useful under the requirements of SB 25 to ensure that California's ambient air quality standards are protective children.

ARB's funding support of the Children's Health Study ceases after June 30, 2004. Under the auspices of an NIEHS grant, the investigators will continue the monitoring effort and health measurements for an additional three years.

### ***Fresno Asthmatic Children's Environment Study***

The Fresno Asthmatic Children's Environment Study (FACES) is the first research project to be funded through the ARB's Vulnerable Populations Research Program. FACES is designed to examine the acute and chronic health effects of particulate air pollution on the natural history of asthma in young children in Fresno. The Fresno area was selected for the study because there is a high prevalence of asthma among the children in the area. The study is being conducted by a team of researchers from a number of organizations, led by investigators at the University of California, Berkeley.

The study is investigating the relationships of air pollutants on acute exacerbations of asthma, the critical exposures leading to the observed acute health effects, the cumulative effects of repeated acute responses to short-term air pollution exposures on the progression of the children's asthma, and the biological or exposure characteristics of groups of children who are more or less responsive to a given exposure. These questions are being addressed by a series of panel studies to assess the short-term effects and a longitudinal study to assess the cumulative effects. The panel studies involve observations of groups of children during three 14-day panel periods per year. During the panel periods the children record the results of twice-daily lung-function tests, asthmatic symptoms, medication usage, and time/location/activity patterns. The longitudinal component involves each subject undergoing detailed health evaluations initially and every six months thereafter.

Parallel with the health studies are detailed evaluations of the exposures to air pollution experienced by the children. Ambient air pollutant data was collected in downtown Fresno and at local schools over a 14-month period during 2002 and 2003. The data will be used to determine the spatial and temporal patterns of pollution across the Fresno area. A series of 100 home-intensive exposure measurements was conducted during 2002-2003. The measurements were for ozone, nicotine, fungal spores, pollen grains, polycyclic aromatic hydrocarbons (PAH), and a variety of other particulate-related parameters. These agents are known to exacerbate asthma. Both indoor (living room) and outdoor (yard) air measurements were made at some of the homes. The data collected during 2002 and 2003 will be analyzed over the next two years and the results reported in August 2005.

### ***Health Effects of Toxic Air Pollutants Pilot Study***

A pilot study was initiated by ARB to evaluate the association of exposures to volatile organic compounds (VOCs) and measures of health in asthmatic children. Very limited information exists on the health effects of exposures to VOCs in the general population, especially in children with preexisting health conditions. The study included an assessment of exposures as measured by VOC concentrations in exhaled breath, the breathing zone, indoor air, and outdoor air to evaluate the associations between breath, personal, indoor, and outdoor concentrations of VOCs and the health effects observed in sensitive populations, including asthmatics. Outdoor VOCs (including benzene, toluene, *m,p*-xylene, and *o*-xylene) measured concurrently with breath VOCs showed significant associations with respiratory symptoms. The findings from this study, in conjunction with experimental and other epidemiologic evidence cited in the literature, suggest that the pro-inflammatory and irritant nature of traffic-related pollutants like benzene can lead to adverse health effects in asthmatic children. The results of this study will be used in future ARB sponsored studies where the impacts of VOCs alone, and in combination with criteria air pollutants, are to be investigated. The full report is available at ARB's website at:

<http://www.arb.ca.gov/research/health/healthres.htm>.

### ***Children's Respiratory Health Study***

With funding obtained through the budget change proposal process, OEHHA completed a cross-sectional study of children in the East Bay to examine the association between measurements of the proximity of traffic and children's respiratory health. Respiratory health surveys were obtained on approximately 1,100 children (8-10 years old) recruited from ten schools in three East Bay

communities (Oakland, San Leandro, and Hayward). The ten schools were chosen to reflect neighborhoods that are near or far from major freeways. Ambient concentrations of traffic-related air pollutants (e.g., nitrogen oxides and particulates) were measured over several seasons. The analysis evaluated the relationship between ambient concentrations of pollutants found at the ten schools and the density and proximity of traffic on roadways and freeways using geographic information system (GIS) methods. The study also examined whether there is an association between reported respiratory symptoms and exposure to traffic-related air pollutants.

The results of the study indicate a correlation between the proximity of a child's school and home to major roadways and the incidence of asthma symptoms and chronic bronchitis (number of new cases in a population over time). There was also a correlation between traffic-related pollutant measurements and exacerbation of asthma and chronic bronchitis. This study provided information used in developing legislation to prohibit the siting of schools very close to major roadways (SB 352, Escutia, 2003). Further study of correlations between traffic-related pollutants and children's respiratory health was curtailed due to budgetary constraints during the 2002-2003 fiscal year. Outside funding is being sought to continue the study of this issue.

#### **Sec. IV Activities of the Children's Environmental Health Center**

The Children's Environmental Health Center (CEHC), within the Office of the Secretary for Environmental Protection, was created by the Children's Environmental Health Act (Chapter 731, Statutes of 1999). To implement the mandates of the Act, the CEHC was staffed full-time by an Assistant Secretary for Children's Environmental Health and part-time by an Assistant Director of the Children's Environmental Health Center. Among its key responsibilities, the CEHC serves as the chief advisor to the Secretary for Environmental Protection and to the Governor on matters within the jurisdiction of the Cal/EPA relating to environmental health and environmental protection. The CEHC is tasked with coordinating within the Cal/EPA and with other state agencies, regulatory efforts, research and data collection, and other programs and services that impact the environmental health of children. It also coordinates Cal/EPA's activities with the appropriate federal agencies conducting regulatory efforts and research and data collection. The CEHC is charged with reporting to the Legislature and the Governor on the progress in implementing the children's environmental health programs within Cal/EPA.

Many of the activities of the CEHC during 2002-2003 were focused on childhood asthma. The Secretary for Environmental Protection formally endorsed the California Department of Health Services' (DHS) Strategic Plan for Asthma following a meeting with the Secretary for Health and Human Services at an asthma conference "Catching Your Breath: Strategies to reduce environmental factors that impact asthma in children" in San Diego in 2001. Cal/EPA endorsed the Asthma Action Agenda developed by the Environmental Council of the States (ECOS) and the Association of State and Territorial Health Officials (ASTHO) in 2003. The CEHC partnered with DHS' California Asthma Public Health Initiative (CAPI) to form a California Interagency Asthma Interest Group to share information and instructional materials on childhood asthma. The CEHC hosted Cal/EPA's first Children's Environmental Health Awareness Day in Sacramento in April 2002. The CEHC hosted a workshop in Sacramento in October 2002 on the outdoor triggers of asthma sponsored by ECOS and ASTHO. The CEHC participated in three other out-of-state workshops on triggers of asthma sponsored by ECOS and ASTHO. CEHC played a major role in drafting the



Asthma Action Agenda in 2002. In 2003, the CEHC contributed to the writing of the Seventh Report of the Good Neighbor Environmental Board with a focus on children's health along our border with Mexico. This report will be presented to the President and Congress in early 2004.

The CEHC applied for two competitive grants in 2003. The Environmental Council of the States awarded Cal/EPA's CEHC a grant to develop recommendations on the best practices for air districts to communicate air quality and health information to school districts, schools, teachers, nurses and coaches. In collaboration with DHS' CAPHI, local air districts and school districts, CEHC will develop a list of options for student activities when outdoor air quality is deemed to be "unhealthy for sensitive groups." The intent is to reduce the levels of exposures to sensitive groups, especially children with asthma and chronic obstructive pulmonary disease. A competitive grant application was submitted to U.S. EPA's Office of Children's Health Protection to establish a bilingual air quality and health information center in Imperial Valley California. CEHC and CAPHI will evaluate the effectiveness of the dissemination of this information according to the best practices developed under the ECOS grant to reduce student absenteeism in the Calexico Unified School District in Imperial County.

CEHC has supported and will continue to support Cal/EPA boards and departments in their regulatory efforts to reduce pollution that affects children. The diesel exhaust reduction measures and school bus idling reduction measures promulgated by the ARB in 2002-2003 will be of significant help to reduce children's exposures to this toxic air contaminant. CEHC supports continued funding of the lower-emission school bus and school bus upgrade program begun by the ARB and the California Energy Commission in 2000. CEHC will participate in ARB's public meetings on the review of the level of health protection afforded to infants and children by the current California Ambient Air Quality Standard for ozone.

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## ***I. Implementation of Ch. 731, Statutes of 1999 (SB 25)***

### **A. Review of California Ambient Air Quality Standards**

#### ***1. Purpose and Requirements of the Legislation***

The Children's Environmental Health Protection Act (Chapter 731, Statutes of 1999 [SB 25]), required the California Air Resources Board (ARB), in consultation with the Office of Environmental Health Hazard Assessment (OEHHA), to review all existing California health-based Ambient Air Quality Standards (AAQS) by no later than December 31, 2000. The purpose of the review was to determine whether the standards, based on public health, scientific literature, and exposure pattern data, adequately protect the health of the public, including infants and children, with an adequate margin of safety. This initial review was also intended to set priorities for more extensive reviews and possible revisions of those standards not considered sufficiently protective of public health, especially with respect to infants and children. The ARB was required to publish a report summarizing the findings of the initial review.

The statute (Health and Safety Code Sections 39606 (b)) requires the Office of Environmental Health Hazard Assessment, when making recommendations to the Air Resources Board on health-based Ambient Air Quality Standards for the Criteria Air Pollutants (CAPs), to assess to the extent that information is available (1) exposure patterns among infants and children that are likely to result in disproportionately high exposure to ambient air pollutants in comparison to the general population; (2) special susceptibility of infants and children to ambient air pollutants; (3) the effects on infants and children of exposure to ambient air pollutants and other substances that have a common mechanism of toxicity; (4) the interaction of multiple air pollutants on infants and children, including the interaction between criteria air pollutants and toxic air contaminants. California has ten criteria air pollutants (ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, visibility reducing particles, sulfates, hydrogen sulfide, and vinyl chloride), and 15 AAQS (some CAPs have multiple standards, for varying exposure times). Following prioritization of the standards for review, the OEHHA shall then provide a recommendation for a health-based standard of the highest priority criteria air pollutant and ARB is to revise the standard within two years of the completion of the prioritization and subsequently revise one standard per year until all California AAQS have been reviewed.

#### ***2. Accomplishments for January 1, 2002 – December 31, 2003***

##### **a. Background: December 2000 Review of California Ambient Air Quality Standards**

A staff report entitled "Adequacy of California Ambient Air Quality Standards: Children's Environmental Health Protection Act" (December 22, 2000) examined each standard's effectiveness in protecting health, and then prioritized them for a more extensive review and revision if necessary. This report was reviewed by the Air Quality Advisory Committee (AQAC), which consists chiefly of scientists in California academic institutions that conduct research in the field. The report found that health effects may occur in infants, children, and other potentially

susceptible subgroups exposed to pollutants at or near levels corresponding to several existing California ambient air quality standards. Based on these factors, the pollutants were placed into two tiers, with the first representing greater potential risks to public health at the concentrations of the current air quality standards.

The first tier of pollutants included particulate matter with a mean aerometric diameter of 10 microns or less (PM<sub>10</sub>), sulfates, ozone, and nitrogen dioxide. The AAQS for these pollutants are being re-evaluated first. The standard for PM<sub>10</sub> was found to have the highest priority for revision. California also has a separate standard for sulfates but since this class of pollutants represented a subset of particulate matter, staff recommended that the sulfates standard be reviewed in conjunction with PM<sub>10</sub>. The second tier of pollutants included lead, carbon monoxide, hydrogen sulfide, and sulfur dioxide.

#### **b. Revision of PM<sub>10</sub> and Sulfate Standards**

PM<sub>10</sub> is a heterogeneous mix consisting of both fine particles (PM<sub>2.5</sub> or particles 2.5 microns in diameter or less) and coarse particles (2.5 to 10 microns in diameter). Fine particles result from fuel combustion (from motor vehicles, power generation, industrial facilities, and residential fireplaces and wood stoves) and agricultural burning. They can also be formed in the atmosphere from gases such as sulfur dioxide, nitrogen dioxide, and volatile organic compounds. Coarse particles generally emanate from sources such as windblown dust, unpaved roads, materials handling, and crushing and grinding operations.

The State of California recognizes that particulate matter (PM) air pollution is a significant public health concern. Numerous scientific studies have shown an association between exposure to particulate matter in the air and adverse health effects primarily on the heart and lung. These adverse health effects range from exacerbation of asthma, hospital admissions for cardiovascular and respiratory illnesses, to premature death from cardiovascular and pulmonary disease. These studies also indicated that the current levels of the national standards, as well as the more stringent California standards for PM<sub>10</sub> adopted in 1982, did not adequately protect public health.

Because of the potentially serious effects of PM exposure on public health, ARB and OEHHA staff reviewed the available scientific literature regarding the impacts of PM air pollution on public health and assessed the need for revisions to the PM standards. Their initial evaluation is in the draft staff report "Review of the California the Ambient Air Quality Standards for Particulate Matter and Sulfates, Report to the Air Quality Advisory Committee," dated November 30, 2001. As part of the standard review process, the AQAC reviewed the draft report. The committee discussed staff's evaluation in public meetings in January and April 2002, and subsequently submitted written findings on the draft report. Those findings, along with public comments received during the review process, were addressed and incorporated into the final ARB/OEHHA staff report titled "Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates," which was released for public review on May 3, 2002. This staff report discusses the health effects of exposure to particulate matter, including effects on sensitive populations such as children and the elderly. It found that studies have consistently reported associations between PM<sub>10</sub> and several different measures of hospitalization or urgent

care for respiratory diseases. The causes for hospitalization for respiratory disease include chronic obstructive pulmonary disease, asthma, and pneumonia. In addition, associations have been reported between PM<sub>10</sub> and the need for urgent care including emergency department visits, doctor visits, and public clinic visits. These effects have been reported among all age groups, including children. The evidence of studies discussed in the staff report suggests that exposures to PM may have a disproportionate effect on children and infants, as well as the elderly.

Several factors may render children and infants more susceptible than the general public to the adverse health effects of PM<sub>10</sub>. These factors include a greater amount of time spent outdoors, greater activity levels and breathing rates, higher doses per body weight and lung surface area, and potential irreversible effects on children's developing lungs. The staff report discussed the significant anatomic and physiological differences between the developing lungs of children and those of mature adults. These include differences in the size and shape of the conducting airways, the number and orientation of physiologically active gas exchange regions, and ventilation rates. Most lung development occurs in infancy and early childhood. Repeated episodes of PM-related injury and inflammation may therefore have long-term consequences on the lung's functional abilities.

A number of studies suggest that children can experience a variety of adverse responses from exposure to PM. For example, recent studies have reported associations between ambient PM and low birth-weight, higher rates of premature births, and intrauterine growth retardation. Also, reports from Mexico, Europe, and the U.S. show associations between PM exposure and increased asthma symptoms in children, while other studies suggest that exposure to PM may result in neonatal or infant mortality.

The May 3, 2002, PM staff report recommended lowering the annual-average PM<sub>10</sub> ambient air quality standard to 20 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), and establishing an annual-average PM<sub>2.5</sub> ambient air quality standard of 12  $\mu\text{g}/\text{m}^3$ . The staff report also recommended maintaining the sulfates standard of 25  $\mu\text{g}/\text{m}^3$  and updating the monitoring methods. Public workshops were held on the review and recommendations in December 2001 and June 2002 at various locations in the State, and staff recommendations were presented to the ARB Governing Board in June 2002. The Board adopted the recommended standards, which became effective on July 5, 2003. Recommendations for 24-hour average PM standards for PM<sub>2.5</sub> and PM<sub>10</sub> were withdrawn due to technical errors contained in the published data sets that formed the basis for these standards. Staff will re-evaluate the scientific literature pertaining to short-term PM standards in the future.

### ***3. Planned Activities for the Next Two Years***

ARB and OEHHA staffs are evaluating the next highest priority criteria air pollutants in order to review and revise the ambient air quality standard. After PM<sub>10</sub>, the next highest priority pollutants are (in order) ozone and nitrogen dioxide. Staffs are actively preparing a review document for ozone, and plan to present it to the ARB's Governing Board in mid-2004. Staffs have begun a review of health effects from exposure to nitrogen dioxide, and plan to present a review document to the ARB's Governing Board in late 2004.

#### ***4. Program Benefits to Children's Environmental Health***

Ambient air quality standards define "clean air", and are established with the intent to protect the health of even the most sensitive individuals in our communities. Evaluating the adequacy of AAQS to protect infants and children will assure that an adequate margin of safety is applied for the most sensitive subset of the general population.

#### ***5. Recommendations***

The ARB and OEHHA recommend continuing the review of the ambient air quality standards on the schedule identified in the Health and Safety Code

## B. Evaluating the Adequacy of California's Air Monitoring Network

### 1. *Community Monitoring Studies: Outdoors*

#### a. Purpose and Requirements of the Legislation

The overall goal of this element of the California Children's Environmental Health Protection Program (the Program) is to evaluate and improve the data available to estimate children's exposures to air pollutants. Insufficient information on the exposures of infants and children poses a significant challenge to assessing the health impacts of air pollution on this vulnerable population. To accomplish this goal, Chapter 731, Statutes of 1999 (Senate Bill 25) requires the Air Resources Board (ARB) to evaluate the adequacy of its ambient air quality monitoring network and assess its ability to provide information on infants' and children's exposures to air pollution. This effort will support a major objective of the Program, which is "to ensure that the state's air quality standards and airborne toxic control measures adequately protect the health of infants and children."

Children are often more at risk than adults from harmful health effects of air pollution because they breathe faster, tend to spend more time outdoors, and engage in higher intensity activities than do adults. The occurrence, nature, and severity of air-pollution related health effects that children experience are dependent on how much of a given pollutant they breathe, which in turn is dependent on the level of a pollutant in the outdoor and indoor air. Although pollution levels tend to be similar throughout a region, there may be pockets of higher air pollutant concentrations located in close proximity to pollution sources such as heavily traveled freeways and industrial facilities. Harmful exposures can occur when children live in homes, attend schools, and play at recreational areas located downwind of these sources.

California's extensive ambient air quality monitoring network was designed to measure regional levels of pollutant concentrations in the air. Its primary purpose is for determining which areas of the State are in attainment or in non-attainment with the health-based State and Federal air quality standards for criteria pollutants such as ozone, particulate matter, oxides of nitrogen, oxides of sulfur, and carbon monoxide. The network provides information to help determine what air pollution control programs and strategies are needed, and to evaluate the success of our air pollution reduction programs. In addition, there are monitors that support the identification of toxic air contaminants (TACs) in the air and help identify locations in the State where there are high levels of TACs. There are also many special purpose monitors throughout the State established to support specific programs. The ambient air global monitoring network has been a useful and necessary tool for assessing the regional level of air pollution in California. However it may not adequately represent the localized environments where children spend most of their time.

Legislative Requirements for Outdoor and Indoor Monitoring. To enhance our understanding of infants' and children's exposures to air pollution, and the health effects associated with those exposures, SB25 added SEC. 4. section 39617.5 to the Health and Safety Code. This addition specified the following:

### ***1.) Outdoor Monitoring Studies***

#### **a.) Current Air Quality Monitoring Network Evaluation**

By no later than January 1, 2003, the ARB is to:

- Evaluate the adequacy of the current outdoor air quality monitoring network for its ability to gather the data necessary to determine the exposure of infants and children to air pollutants including criteria air pollutants and toxic air contaminants.
- Identify areas where the exposure of infants and children to air pollutants is not adequately measured by the current monitoring network.
- Recommend changes to improve air pollution monitoring networks and data collection to more accurately reflect the exposure of infants and children to air pollutants.

#### **b.) Expansion of the Network in Six Communities**

For the purpose of sampling air pollution in locations where children spend time, the ARB, in cooperation with local air quality districts is to expand its existing monitoring program in six communities around the state in non-attainment areas. This expansion is to include:

- Special monitoring of children's exposures to air pollutants and toxic air contaminants.
- Placement of air pollution monitors near schools, daycare centers, and outdoor recreational facilities that are in close proximity to, or downwind from, major industrial sources of air pollutants and toxic air contaminants, including, freeways and major traffic areas.
- Monitoring during multiple seasons and at multiple locations within each community at schools, daycare centers, recreational facilities, and other locations where children spend most of their time.
- A combination of approaches to provide the most comprehensive data possible on the levels of children's exposure to air pollutants and toxic air contaminants. These approaches include:
  - Upgrades to existing fixed monitoring sites.
  - Establishment of new fixed monitoring sites.
  - Conducting indoor and outdoor sampling and personal exposure measurements in each community.

The legislation also stipulates that data collected from expanded air quality monitoring activities may be used for any purpose, if the monitoring devices used to collect the data meet Federal and State regulations pertaining to pollutant measurement methods.

In the following sections, the implementation of this element of the legislative requirements is discussed.



**b. Accomplishments for January 1, 2002 – December 31, 2003****1.) *Community Monitoring Studies*****a.) Community Selection**

Working with the local air quality districts and community groups, the ARB selected six areas that exemplify the diversity of weather, geography, and air pollution sources present in California where emissions from diesel exhaust, automobiles, neighborhood sources, refineries, and marine sources can affect air quality. The following are the six communities chosen: Barrio Logan (San Diego); Boyle Heights (Los Angeles); Wilmington (Los Angeles); Fruitvale (Oakland); Crockett; and Fresno. Descriptions of each monitoring site can be found in the next section.

All the sites were at or near schools. Each monitoring site had a primary monitoring location, and some also had a satellite location in the community. The central air monitoring station at each site measured a comprehensive suite of air pollutants. They include what are referred to as criteria pollutants, for which the ARB or U.S. EPA has identified harmful above a specific level. These include carbon monoxide, ozone, oxides of nitrogen, sulfur dioxide, particulate matter smaller than 10 microns (PM<sub>10</sub>), and particulate matter smaller than 2.5 microns (PM<sub>2.5</sub>). Some of toxic gases and metals included in the monitoring include known carcinogens such as 1,3-butadiene, benzene, formaldehyde, and hexavalent chromium. Measurements are stored as either hourly or 24 hour average values. Each central site was equipped with meteorological sensors that recorded wind speed, wind direction, relative humidity, barometric pressure, and ambient temperature.

Although the ARB was the lead agency for carrying out Children's Environmental Health Protection Program monitoring and had overall responsibility for the study, the Bay Area Air Quality Management District and the South Coast Air Quality Management District assisted with the monitoring. ARB staff conducted quality control and quality assurance activities.

**i. Barrio Logan**

Barrio Logan is a small community located in San Diego near the shipyards and the Coronado Bridge. The community was selected for air monitoring because it is located in a large urban area, near major freeways and industrial sources, as well as neighborhood sources such as gas stations, dry cleaners, and automotive repair facilities.

The monitor was installed at Memorial Academy Charter School located at 2850 Logan Avenue, in an area bounded to the north and east by State Routes 94 and 15, respectively, and to the west by Interstate 5. The neighborhood is southeast of the entrance to the Coronado Bridge. The results from monitoring at Memorial Academy was used to assess differences between air toxic concentrations detected in Barrio Logan and those detected at air monitoring sites in the communities of Chula Vista and El Cajon. The ambient air quality monitoring at Memorial Academy Charter School occurred between October, 1999 and March 2001. The special

purpose chromium study, which consisted of more localized monitoring, took place in the fall of 2001.

The data collected from Logan Memorial indicated that there was one exceedance of the State ozone standard and six exceedances of the State PM<sub>10</sub> standard. These results were similar to the data collected at the nearest routine monitor, which is located in San Diego at 12<sup>th</sup> Ave. The complete report can be found on the ARB website:

[http://www.arb.ca.gov/ch/communities/studies/barriologan/barriologan\\_17monthstudy.htm](http://www.arb.ca.gov/ch/communities/studies/barriologan/barriologan_17monthstudy.htm)



#### Additional Monitoring in Barrio Logan

In addition to monitoring at Logan Memorial Academy we also monitored near two chrome plating operations, a source of hexavalent chromium, a potent cancer-causing pollutant. Monitoring near the chrome platers in Barrio Logan showed unexpectedly high localized hexavalent chromium levels. The facility that was the source of the chromium emissions has now ceased operations. This site became the subject of a major special study and those results can be found on the Web at the following:

[http://www.arb.ca.gov/ch/communities/studies/barriologan/barriologan\\_chromium.htm](http://www.arb.ca.gov/ch/communities/studies/barriologan/barriologan_chromium.htm).)

#### **ii. Boyle Heights**

Boyle Heights is located in central Los Angeles County, southeast of downtown Los Angeles. Four major freeways, Interstates 5 and 10 and Highways 60 and 101, border the community. The Boyle Heights community was chosen because of its proximity to several major freeways and because of the high number of children living in the community.

The primary site was placed at Hollenbeck Middle School, which is located at 2510 East 6<sup>th</sup> Street in the residential area of Boyle Heights, and is approximately one-half mile downwind of

the convergence of four major Los Angeles area freeways. Hollenbeck Middle School has a student population of 2200. Theodore Roosevelt Senior High School, located directly across from Hollenbeck, is one of the largest high schools in Los Angeles County with an enrollment of over 5000.

Additional monitoring was conducted at two other locations within the Boyle Heights community to better assess the impact of vehicular emissions on children in an area a short distance from the freeway. The satellite site locations are the East Los Angeles Mathematics, Science, and Technology Center located at 961 Euclid Avenue and the Soto Street Elementary School located at 1020 South Soto Street. Monitoring at Hollenbeck Middle School began in February 2001 and ran through May 2002. The satellite sites ran from March 2001 through October 2001.



The results indicate that there were five exceedances of the State ozone standard and 20 exceedances of the State PM<sub>10</sub> standard at Hollenbeck Middle School. The PM<sub>10</sub> results from Soto Street Elementary School on average showed PM<sub>10</sub> levels that were 35% higher than the levels reported from Hollenbeck. This site also reported more PM<sub>10</sub> exceedances - 28 days compared to the 9 days reported at Hollenbeck. The particulate matter levels and frequency of State standard exceedance were comparable at the Hollenbeck and Science Center sites. All of the measured toxics showed levels nearly identical to the levels at the nearest toxics site, also at Los Angeles – N. Main St., including benzene and 1,3-butadiene.

The complete report can be found on the ARB website at:

<http://www.arb.ca.gov/ch/communities/studies/boyleheights/boyleheights.htm>

### iii. Wilmington

The Wilmington community is located in the southern part of Los Angeles County near the Ports of Los Angeles and Long Beach. Wilmington was chosen because of the proximity of high-risk facilities to schools in the community. Wilmington is home to several oil refineries with a combined refining capacity of over 250,000 barrels per day. Wilmington is also situated near the

ports of Los Angeles and Long Beach, which are sources of diesel and fugitive emissions from bulk transport activities.

Monitoring was conducted at Mahar House, a Los Angeles-based charitable organization, which is located at 1113 Mahar Avenue. Mahar House is across the street from the Wilmington Park Elementary School and the Wilmington Children's Center located at 1115 Mahar.



Additional monitoring was conducted at a secondary site, located at Hawaiian Elementary School (540 Hawaiian Avenue). Ambient air quality monitoring at Wilmington Park Elementary began in May 2001 and ran through July 2002. Ambient air monitoring at the Hawaiian Elementary School began in November 2001 and ran through May 2002.

The results from Wilmington Park Elementary School indicated that there were 15 days that exceeded the State standard for PM<sub>10</sub> and no exceedances of the State ozone standard at Wilmington Park School or North Long Beach. The toxics levels at the nearest routine site, also at North Long Beach, were similar to the levels found at Wilmington Park School.

The particulate matter levels measured at Hawaiian School were higher than those measured at either of the Wilmington school, or the downtown Los Angeles site. The State 24-hour PM<sub>10</sub> standard was exceeded on 26% of the days measured at Wilmington Park School, while it was exceeded 42% of the days measured at the Hawaiian School over a seven-month period.

The complete report can be found on the ARB website at:

<http://www.arb.ca.gov/ch/communities/studies/wilmington/wilmington.htm>



#### iv. Fruitvale

The Fruitvale community is located in Oakland near Fruitvale Avenue and International Boulevard. It was chosen because it is impacted by several categories of pollutant emissions and because of the high school-age population in the area. This community lies between two major East Bay Area freeways that are a significant source of vehicular emissions. It is also less than five miles from the Oakland International Airport, a source of aircraft and ground-vehicle emissions.



Lockwood Elementary was selected as the monitoring site. The school is located at 6701 International Boulevard (East 14<sup>th</sup> Street) and is part of an educational complex that includes Havenscourt Middle School and a child development center. Lockwood Elementary has a student population of nearly 1000. Havenscourt Middle School and the child development center have a combined enrollment of over 800. The educational complex is situated between the 580 and 880 freeways, and near the Oakland Coliseum. It is adjacent to heavily traveled surface streets, and is also downwind of several industrial facilities located near the Oakland Estuary.

Ambient air monitoring at Lockwood Elementary School began in November 2001 and ran through April 2003. Dioxin monitoring began in January 2002 and will continue for two years. Results from Lockwood Elementary School indicated that there were no exceedances of the ozone and CO state standards but there were two exceedances of the PM<sub>10</sub> state standard.

The complete report will be found on the ARB website at:

<http://www.arb.ca.gov/ch/communities/studies/fruitvale/fruitvale.htm>

### **v. Crockett**

The city of Crockett is located in northern Contra Costa County where the Carquinez Bridge (Interstate 80) crosses the Carquinez Strait. Crockett was chosen because of its proximity to industrial and mobile source emissions. Oil refineries and major oil storage facilities are located in the nearby cities of Rodeo, Hercules, Martinez, and Benicia. Crockett is situated downwind of several of the refineries under the dominant wind flow patterns in the area. Crockett is also the location of a major food processing operation and a heavy-rail transfer facility. Sulfur dioxide air quality levels in Crockett are among the highest in the Bay Area.

The monitors were located at John Swett High School. The high school is located at 1098 Pomona Street. The student population of John Swett High School is approximately 650. Carquinez Middle School, located directly across Pomona Street from the high school, has a student population of 500. The schools are located approximately one-half mile downwind of Interstate 80, a major source of vehicle emissions. Monitoring began in October 2001 and ran through May 2003.

The results from John Swett High School indicated that the ozone level never exceeded the state standard but there was one exceedance of the state PM<sub>10</sub> standard.

The complete report will be found on the ARB website at:

<http://www.arb.ca.gov/ch/communities/studies/crockett/crockett.htm>

### **vi. Fresno**

Fresno was chosen as a monitoring site because of its location in the California Central Valley and its proximity to a heavily used highway. Also Fresno is part of an ongoing monitoring program associated with the Fresno Asthmatic Children's Environment Study (FACES). The FACES program is tracking over 300 asthmatic children to determine the impact of air pollution on the disease.

Monitoring at Fremont School, located at 1005 West Weldon Avenue, began monitoring in June 2002 and ran through August 2003. Insufficient data are available from the SB 25 site in Fresno (Fremont School) to present results in this report. SB 25 monitoring at Fremont School is scheduled to coincide with the ARB's childhood asthma study (FACES). A final report on the Fresno data will be prepared following completion of the study.



## 2.) Evaluation of the Statewide monitoring network

As one of the requirements of the Children's Environmental Health Protection Program, an evaluation of the statewide air monitoring network was conducted to ensure that children's exposure to air pollutants was being adequately characterized. One goal of the community monitoring program was to determine whether or not pollutant levels, where children live and play, were similar to levels measured by the routine monitoring network.

The six sites were selected with the anticipation that we would find higher levels of pollution than found at nearby routine monitoring sites. This was because we selected monitoring locations downwind of areas with high concentrations of emission sources. We took this approach to maximize the possibility of finding exposure differences between individual communities and typical regional exposures. In general, we found that levels of air pollution at the six sites were quite similar to the levels found at the nearby routine monitors, except in areas with near-source emissions. We also recognize, however, that pockets with higher pollution levels may exist within communities due to the close proximity of one or more pollution sources.

In evaluating the monitoring network, we compared the monitoring results with routine network data. The purpose of this analysis was to determine how well the network monitoring data represents exposures in nearby communities. We also used a combination of network monitoring data and statistical analyses as another method to evaluate the ability of network data to characterize the air pollution exposure of children.

Based on these analyses, we find that the statewide monitoring network provides the fundamental data needed to determine typical outdoor exposures of children to air pollution in

California communities. At the same time, we find that additional methods are needed to assess localized exposures that may occur near specific air pollution sources.

The entire Assessment of California Statewide Air Monitoring Network Report can be found on the ARB website at: <http://www.arb.ca.gov/ch/programs/sb25/adequacy.htm>

### ***3.) Providing Information***

A primary objective of this element of the Program is to provide useful information about local air quality to the citizens of each community. ARB committed to provide air quality data back as soon as possible to the public. The ARB, working with the local air pollution districts, reviewed and summarized the data, and now this information is posted on the ARB website ([www.arb.ca.gov](http://www.arb.ca.gov)). During the monitoring, ARB staff gave progress reports at several community meetings. Once the monitoring was complete and the data evaluated, ARB staff returned to several communities and discussed the results of the monitoring.

#### **c. Planned Activities for the Next Two Years**

ARB's monitoring efforts and evaluation of the routine monitoring network, in support of the Children's Environmental Health Protection Program, have been completed. We will continue our work to understand air pollution effects on children with continued participation in community monitoring studies.

#### **d. Program Benefits to Children's Environmental Health**

The additional information gathered through ARB's monitoring efforts was critical for the evaluation of the existing air quality monitoring network's adequacy for assessing children's exposures. The information has enhanced our understanding of how well the measurements made at existing sites within a community relate to specific locations where children spend time. This additional data can provide guidance on whether certain measurements need to be strategically added to the existing monitoring network. The insights provided by the monitoring efforts, described above, can be used to guide public health policy that relates to assessing children's exposures to air pollution, and to mitigating those exposures.

#### **e. Recommendations**

ARB developed three recommendations designed to supplement the air pollution exposure Information provided by the statewide monitoring network. We are implementing these recommendations as part of our community health and environmental justice programs. The recommendations are to:

- Use our mobile monitoring capability for short-term special purpose assessments to supplement the statewide monitoring data.



- Improve emission estimates and air quality modeling methods to assess localized exposures near air pollution sources.
- In the 2003 Innovative Clean Air Technologies (ICAT) Program, fund development of lower-cost monitoring methods to provide for expanded community level monitoring in the future.

## ***2. Indoor Air Monitoring Study***

Indoor and personal exposure monitoring are required under SB 25 to provide more comprehensive data to define the levels of children's exposure to air pollutants and to facilitate an assessment of the adequacy of the monitoring network in estimating those exposures. In the *Children's Microenvironmental and Personal Exposure Study*, children's exposures to air pollutants inside classrooms were measured during the 2001-2002 school year in three of the selected SB 25 communities.

### **a. Accomplishments for January 1, 2002 – December 31, 2003**

The ARB contracted with Dr. Steven Colome of the University of California, Los Angeles to conduct indoor pollutant monitoring studies. Measurements were made for particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), organic carbon and elemental carbon, 13 aldehydes, carbon dioxide (CO<sub>2</sub>), and ten volatile organic compounds (VOCs) including benzene, methylene chloride, tetrachloroethylene, and styrene. Measurements were obtained inside three classrooms at each school, at one location outside on the school grounds, and in a residence near the school. Sampling was conducted between January and June, 2002, and included four weeks at Hollenbeck Middle School in Boyle Heights, six weeks at Wilmington Park Elementary School in Wilmington, and three weeks at John Swett High School in Crockett. Samples at schools were collected over week-long periods while school was in session, resulting in 35-hour integrated samples. The residential samples were collected over 24 hours.

Students in the participating classrooms had the opportunity to wear personal VOC badges for 48-hours. The badges measured their exposure to VOCs as they went about their daily routine at home, at school, and everywhere they went. One hundred and one students participated in this personal monitoring; however, only 72 badges were returned that were suitable for analyses. The contractor also administered a health status survey to students in the monitored classrooms to determine the prevalence of asthma and allergies.

A subcontractor presented an air pollution curriculum to classes on request. The curriculum included basic information on air pollution and ways to reduce exposures to indoor and outdoor air pollution.

The contractor prepared a report of preliminary partial findings in September 2002 for ARB review. During 2003, he completed data analysis and interpretation, and prepared the draft final report, which will be reviewed by the Research Screening Committee in February 2004. Preliminary data from measurements taken inside school classrooms and outdoors on the

school grounds are consistent with general trends reported in the literature. Preliminary data for aldehydes indicate that classroom concentrations tend to be equal to or higher than the corresponding outdoor concentrations at the schools. This generally indicates that like most other indoor environments, there are indoor sources of formaldehyde and other aldehydes at the schools.

#### **b. Program Benefits to Children's Health**

The study results will provide information that will help the ARB identify differences between pollutant levels measured at network monitoring sites and children's indoor and personal exposures to air pollutants. The personal monitoring data will provide insight to children's actual exposures to toxic air pollutants. The microenvironmental monitoring data collected at locations where children spend most of their time – at school and home – will expand our knowledge of how indoor sources contribute to children's exposures. Finally, this information will be useful in identifying additional pollutant sources that may require emission reductions in the future.

#### **c. Recommendations**

Recommendations will be developed once the data analyses and the draft final report are completed.

#### **d. Planned Activities Over the Next Two Years**

After approval of the draft final report by ARB's Research Screening Committee, anticipated in February, 2004, the contractor will finalize the report. The final report will be released to the public and placed on ARB's website in spring, 2004. The results will be used by the ARB's Community Health and Indoor Air Quality Programs to expand our knowledge on children's exposure to air pollution.

## C. Review of Toxic Air Contaminants

### 1. *Prioritizing Toxic Air Contaminants of Concern for Infants and Children*

#### a. Purpose and Requirements of the Legislation

Senate Bill 25 added a new section to the Toxic Air Contaminant Program established in the Health and Safety Code (Chapter 3.5, section 39650 et seq.) with special provisions for children. In these provisions, the Office of Environmental Health Hazard Assessment is required to develop a list (the List) of up to five toxic air contaminants (TACs) that may cause infants and children to be especially susceptible to illness. The Air Resources Board must then review affected airborne toxic control measures for TACs on the List within two years (by July 2003) to ensure they adequately protect infants and children. If there are no existing control measures for a TAC on the List, the ARB must prepare a needs assessment and adopt appropriate control measures within three years (by July 2004). Beginning July 1, 2004, and annually thereafter, the OEHHA is required to evaluate 15 TACs and provide threshold and non-threshold exposure levels, and update the List. Once the List is updated, the ARB must then again review any existing control measures and prepare a needs assessment and adopt appropriate control measures for up to five TACs. The specific requirements and actions taken by OEHHA and the ARB to implement these provisions of Senate Bill 25 are discussed in more detail below.

#### b. Accomplishments during January 1, 2002 – December 31, 2003

##### 1.) *Prioritization of the Toxic Air Contaminants and Development of ATCM*

Prior to January 1, 2002, The OEHHA had conducted preliminary assessments of all identified TACs (includes about 200 chemicals or chemical classes) in order to generate the List. Using information on health effects, ambient air concentrations, and emissions sources, 36 TACs were identified and prioritized for focused literature searches. The review of the literature evaluated information on the potential for differential impacts on infants and children as compared to adults including:

- a.) Any evidence indicating that infants and children may be more susceptible than adults to the toxicological effects associated with that TAC. The strength of this evidence was weighted heavily in the initial selection of 17 TACs that disproportionately impact children.
- b.) The nature and severity of effect(s), especially if they are irreversible.
- c.) Any evidence indicating that, based on current risk assessment methodology, the existing health criteria may not be adequately protective of infants and children.
- d.) Any potential difference in susceptibility of infants and children (relative to adults) to carcinogenesis based on known information or plausible mechanisms.
- e.) Extent of exposure and/or the magnitude of risk estimated to occur at concentrations typical of California urban ambient air, and any indication that infants and children may experience greater exposures to materials contaminated by airborne particles (e.g., house dust).

Because children undergo more rapid rates of development than adults, the expectation is that chemicals that affect the nervous system, respiratory system, immune system, endocrine and reproductive organs, and exhibit developmental toxicity would impact children more than adults.

Thus, those TACs that are neurotoxicants, endocrine disruptors, immunotoxicants, respiratory system toxicants, and developmental toxicants were of most concern.

Exacerbation of asthma is included as a toxicological endpoint of particular concern to children. Children, especially young children, are impacted by asthma morbidity more than adolescents and adults. Therefore, TACs that exacerbate or induce asthma will be considered for listing under the Children's Environmental Health Protection Act.

Five TACs were listed under Health and Safety Code Section 39669.5(a) as possibly causing infants and children to be especially susceptible to illness. These are: polycyclic organic matter (POM) or polycyclic aromatic hydrocarbons (PAHs), lead, polychlorinated dibenzo-*p*-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) (collectively identified as "dioxins"), particulate emissions from diesel-fueled engines, and acrolein. The final technical support document (Prioritization of Toxic Air Contaminants under the Children's Environmental Health Protection Act) discusses the five chemicals (or class of chemicals) that constitute the initial List of TACs that may cause infants and children to be especially susceptible to illness.

#### **c. Planned Activities For the Next Two Years**

OEHHA will update the List by July 1, 2005 or earlier with at least five TACs.

#### **d. Program Benefits to Children's Environmental Health**

Ongoing review of the scientific literature on the health effects of TACs ensures that those that affect children more than adults are brought before the Air Resources Board in a timely manner.

#### **e. Recommendations**

Continued support of this program is recommended in order to determine which TACs pose the greatest harm to infants and children.

### **2. *Risk Assessment Methodologies***

#### **a. Purpose and Requirements of the Legislation**

In addition to developing a list of TACs that may differentially impact infants and children, the Act also requires OEHHA by July 2004 to begin evaluating 15 TACs per year. The review includes evaluating their health criteria (cancer potency estimates and estimates of non-cancer health effects levels, called Reference Exposure Levels (REL)) for adequacy in protecting children and revising those criteria if appropriate. While the statute requires OEHHA to evaluate infants and children specifically, it is important to note that existing risk assessment methodologies use protective assumptions to protect children when evaluating and quantifying risk from exposure to chemicals. These assumptions include use of the 95% Upper Confidence Limit of the slope of the dose-response curve (in other words, a high-end estimate) when evaluating cancer potency and use of an uncertainty factor of 10 for inter-individual variability in the human population when developing noncancer RELs (in other words, we assume that there is a 10-fold variability in

response to toxic chemicals in the human population). Risk assessors have always known that such assumptions are crude but data have generally been lacking to use anything other than such assumptions for most chemicals. As part of the TAC evaluation process for SB 25, OEHHA is evaluating available information to assess the adequacy of these assumptions in protecting infants and children from toxic air contaminants. These evaluations will be used to modify current risk assessment methods where appropriate to ensure adequate protection of infants and children. This information is needed to evaluate the 15 TACs per year.

#### **b. Accomplishments During January 1, 2002 – December 31, 2003**

OEHHA initiated a revision of the risk assessment guidelines used in the Toxic Air Contaminant programs (including the Air Toxics Hot Spots program) to provide more specific measures to address early-in-life exposures to toxic air contaminants. These guidelines will help to adequately re-assess the 15 TACs per year as required under SB 25. As part of this effort, OEHHA reviewed the new revised cancer risk assessment guidelines for early-in-life exposure to carcinogens published by U.S. EPA in 2003. OEHHA also initiated a review of the literature on carcinogenicity of a number of chemicals when exposure can occur early in life. These reviews will allow modifications of cancer risk assessment methodology to adequately account for exposure to infants and children. The new U.S. EPA guidelines will serve as a starting point for the interim risk assessment guidelines under SB 25 for adequate protection of infants and children from carcinogen exposure. OEHHA is developing a document that describes the concern for early-in-life exposures to carcinogens. The document will include an assessment of default procedures that could be used to modify existing cancer risk assessment methods in order to account for early-in-life exposures and this affects estimates of lifetime cancer risk. As discussed in Section II Part A of this biennial report on implementation of AB 2872, OEHHA is participating in a longer-term effort to develop models that more vigorously evaluate data on early-in-life exposure to compare the potency of carcinogens when administered to test animals at various ages.

During the reporting period, OEHHA initiated a review of the scientific literature on factors that influence physiological responses to toxicants and how these factors can differ by age. This information will help to determine whether the default uncertainty factor(s) used to account for differences in response within the human population (intra-species differences) also accounts for differences in age (children and adults). OEHHA is developing a document that will describe methods for assessing risks for non-cancer toxicity for infants and children.

#### **c. Planned Activities Over the Next Two Years**

OEHHA will conduct an in-depth analysis of information in the scientific literature that should help determine whether existing methods are adequate to characterize risks for infants and children. By December 1, 2005, existing methods will be evaluated and modified as appropriate. The toxicological and epidemiological data on 15 TACs will be evaluated each year commencing in July 2004. The evaluation will include review of health values (both cancer potency factors and Reference Exposure Levels) to ensure they are adequate to protect infants and children. This evaluation process will include both public comment and peer review.

OEHHA will evaluate additional TACs for inclusion on the List of TACs that may differentially impact infants and children. The list will be updated by July 1, 2005.

**d. Program Benefits to Children's Environmental Health**

The question of whether current standards and criteria are adequately protecting infants and children from airborne chemical toxicants has been posed for some time. Recent developments and advancements in science are beginning to provide answers. The implementation of the statutory requirements of SB 25, specifically the continuing evaluation of TACs, will bring to the forefront information that can be used to answer whether current State or federal health criteria are adequate to protect infants and children. As the risk assessment guidelines are appropriately modified to better account for infants and children, and as TACS are evaluated to ensure that their health criteria are adequate over the long term, revised standards and effective control measures should better protect infants and children from environmental contaminants.

**e. Recommendations**

Continued support of this program is recommended in order to provide the technical and health information needed by regulatory agencies to better protect infants and children from toxic air pollutants.

**3. *Identification of Additional Chemicals as Toxic Air Contaminants that Can Disproportionately Impact Infants and Children***

**a. Purpose and Requirements of the Legislation**

Senate Bill 25 modified the portion of the Health and Safety Code describing the identification of toxic air contaminants. Specifically, the bill requires that OEHHA when assessing the health effects of candidate toxic air contaminants consider 1) the exposure patterns among infants and children that are likely to result in disproportionately high exposure; and 2) special susceptibility of infants and children in comparison to the general population. Based on a 1997 health assessment by OEHHA, the Air Resources Board entered Environmental Tobacco Smoke (ETS) into the formal process for identification as a toxic air contaminant.

**b. Accomplishments during January 1, 2002 - December 31, 2003**

The OEHHA has developed a comprehensive health effects assessment of ETS. This assessment updates a 1997 OEHHA document on ETS health effects including reviewing the most recent literature on health effects of ETS on infant's and children's respiratory systems and exposures of infants and children. The document will undergo public review and comment prior to review by the State's Scientific Review Panel on Toxic Air Contaminants.

### **c. Planned Activities Over the Next Two Years**

The OEHHA plans to work with the Air Resources Board to complete the identification process for ETS. This includes responding to public comments, conducting peer review of the ETS health effects document, and revising the document as appropriate.

The OEHHA will also work with ARB on any health effects assessments for additional candidate TACs or TACs for which ARB needs a health effects assessment.

### **d. Program Benefits to Children's Environmental Health**

The implementation of these provisions of the Children's Environmental Health Act ensure that the health effects assessments conducted for TACs include a review of health impacts on infants and children specifically, as data are available. The emphasis on infants and children provides assurance that the control measures taken by the ARB include consideration of children's exposures. The result is a healthier environment for the children of California.

### **e. Recommendations**

Continued support of identification of toxic air contaminants and assessment of health effects including effects on infants and children is recommended. This program is essential to protect air quality and the health of California's children.

## **4. Air Toxics Control Measures**

### **a. Purpose and Requirements of the Legislation**

The goal of the air toxics program is to reduce to the maximum extent feasible, or eliminate when possible, exposure to toxic air pollutants to all Californians, including infants and children. With regards to the control of air toxics, Senate Bill 25 requires the Air Resources Board (ARB or Board) to take two actions within specified timeframes:

- 1.) Prepare a needs assessment report and adopt control measures, as appropriate, for the toxic air contaminants (TACs) identified on the List as making infants and children more susceptible to illness and that have no existing control measures; and
- 2.) Review and revise, if necessary, any control measures that had been adopted for the TACs identified by OEHHA.

The five TACs identified by the OEHHA for which these actions must be taken are: acrolein, particulate matter from diesel-fueled engines (diesel PM), dioxins, lead, and polycyclic organic matter (POM) or polycyclic aromatic hydrocarbons (PAHs).

### **b. Accomplishments for January 1, 2002 - December 31, 2003**

The ARB adopted or considered for adoption four new ATCMs to reduce exposures for diesel PM. Reducing harmful levels of diesel PM is a key priority of the ARB because of its identification as a TAC that may cause infants and children to be more susceptible to illness and

it is estimated to contribute about 70 percent of the potential cancer risk from air toxics statewide.

Diesel PM was identified as a TAC in 1998 and the ARB adopted a needs assessment report in September 2000, entitled the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (the Diesel Risk Reduction Plan). The Diesel Risk Reduction Plan outlines control measures to be developed over the next several years with the goal to reduce diesel PM emissions by 75% in 2010 and 85% by 2020. Since then, the Board adopted regulations establishing new heavy-duty diesel engine standards and reducing emissions from public transit buses. Summarized below are four airborne toxic control measures (ATCMs) adopted or considered for adoption by the ARB as of January 1, 2004 to reduce emissions of diesel PM.

- School Bus Idling ATCM:

The School Bus Idling ATCM will reduce children's exposure to diesel PM. The ATCM requires a driver of a school bus or vehicle, transit bus, or other commercial motor vehicle to manually turn off the bus or vehicle engine upon arriving at a school and to restart no more than 30 seconds before departing. A driver of a school bus or vehicle is subject to the same requirement when operating within 100 feet of a school and is prohibited from idling more than five minutes at each stop beyond schools, such as parking or maintenance facilities, school bus stops, or school activity destinations. A driver of a transit bus or other commercial motor vehicle is prohibited from idling more than five minutes at each stop within 100 feet of a school. Idling necessary for health, safety, or operational concerns is exempt from these restrictions. This ATCM was adopted by the Board in December 2002.

- Solid Waste Collection Vehicle ATCM:

Diesel-fueled solid waste collection vehicles are of concern because they operate in residential communities on a regular basis, exposing infants and children in the community to diesel PM. The Solid Waste Collection Vehicle ATCM will reduce emissions of diesel PM from 1960 to 2006 model years diesel-fueled engines in residential and commercial solid waste collection vehicles. The owners of these collection vehicles must use best available control technology for their engines, which is defined as either a new low emissions engine or retrofitting an existing engine with a verified diesel emission control strategy meeting a 0.01 gram per brake horsepower-hour particulate matter standard. Other compliance options include an alternative-fuel engine or heavy-duty pilot-ignition engine; or application of an Air Resources Board-verified diesel emission control strategy to the engine, which reduces diesel particulate matter emissions by the greatest amount possible for that engine and application. This ATCM was adopted by the Board in September 2003.

- Stationary Diesel Engines ATCM:

Stationary engines are used as emergency back-up generators and can often be found at hospitals, near schools, and other areas where children may be present. The proposed



ATCM establishes emission standards, including a standard for diesel PM emissions, that sellers of stationary diesel-fueled engines would have to meet. The requirements can be grouped into three general categories: fuel use requirements, operational requirements and emission standards recordkeeping, reporting, and monitoring requirements. In general, the goal of these requirements is to have the owners and operators of diesel-fueled engines use the cleanest fuels possible, limit the unnecessary operation of their engines, and control the emissions of diesel PM to the greatest extent possible, in consideration of technical and economic feasibility. The ATCM was considered for adoption by the Board in November 2003.

- Transport Refrigeration Units ATCM:

Transport Refrigeration Units (TRU) are used in semi-trailer vans and trucks that transport food and other perishable items. The vans and trucks carrying a TRU can be found in large numbers at distribution facilities that are often located in urban and residential areas where children live and play. This proposed ATCM will reduce diesel PM emissions from TRUs and from the generators used to power refrigeration units. The proposed ATCM requires in-use TRU engines operating in California to meet specific performance standards for two engine size categories. The in-use performance standards have two levels of stringency that would be phased-in over time. The first phase, beginning in 2008, is referred to as the low emission TRU performance standards. The second phase, beginning in 2010, is referred to as the ultra-low emission TRU performance standards. This ATCM was considered for adoption by the Board in December 2003.

The ARB also reviewed two existing ATCMs pursuant to the requirements of Senate Bill 25 to ensure they continued to provide public health protection, especially for infants and children. These two ATCMs reduce emissions of dioxins and lead. A summary of the existing control measures and actions taken to review them are discussed below.

- Airborne Toxic Control Measure (ATCM) for Dioxins from Medical Waste Incinerators:

This ATCM requires 99% control of dioxin emissions from medical waste incinerators burning more than 25 tons per year or to emit dioxins at a rate less than 10 nanograms per kilogram of waste (equates to 10 billionths of a gram of dioxins emitted per gram of waste burned). Operators must also conduct two consecutive annual source tests. Smaller facilities, depending on the amount of waste burned, are subject to source testing, record-keeping, and operator training requirements. This ATCM was adopted by the Board in July 1990.

To evaluate the Medical Waste Incinerator ATCM, ARB staff: 1) updated the statewide inventory of medical waste incinerator facilities; 2) distributed a comprehensive medical waste incinerator survey and conducted an analysis of the survey responses; 3) held a stakeholder meeting to solicit input from all interested parties; 4) conducted site visits; 5) in consultation with the Department of Health Services, summarized non-incineration treatment technologies and evaluated specific alternative treatment options for each medical waste

incinerator; and 6) conducted risk assessments for various sizes of facilities. ARB staff recommended that no revisions to the ATCM were needed.

- Airborne Toxic Control Measure for Toxic Metals from Non-Ferrous Metal Melting:

This ATCM requires certain non-ferrous metal melting facilities to reduce emissions of toxic metals, including lead, arsenic, cadmium and nickel. Operators must also comply with a fugitive emissions limit by implementing a dust control plan and complying with a visible emissions limit of less than 10 percent opacity. Specified exemptions are offered to small and low-emitting facilities. This ATCM was adopted by the Board in January 1993.

To evaluate the Non-Ferrous Metal Melting ATCM, ARB staff: 1) compiled a list of statewide facilities; 2) conducted a survey to determine the amount of lead melted at each facility; 3) assessed existing control equipment; and 4) performed an exposure and risk analysis. ARB staff recommended that no revisions to the ATCM were needed.

### c. Planned Activities Over the Next Two Years

For those TACs on OEHHA's List for which there are no existing control measures, the ARB is required to prepare a needs assessment report and adopt control measures, as appropriate, within three years of their identification. Health and Safety Code section 39665 has specific requirements for issues to be addressed, to the extent that data are available, in a needs assessment report. Specifically, the report must address:

- (1) The rate and extent of present and anticipated future emissions, the estimated levels of human exposure, and the risks associated with those levels.
- (2) The stability, persistence, transformation products, dispersion potential, and other physical and chemical characteristics of the substance when present in the ambient air.
- (3) The categories, numbers, and relative contribution of present or anticipated sources of the substance, including mobile, industrial, agricultural, and natural sources.
- (4) The availability and technological feasibility of airborne toxic control measures to reduce or eliminate emissions, the anticipated effect of airborne toxic control measures on levels of exposure, and the degree to which proposed airborne toxic control measures are compatible with, or applicable to, recent technological improvements or other actions which emitting sources have implemented or taken in the recent past to reduce emissions.
- (5) The approximate cost of each airborne toxic control measure, the magnitude of risks posed by the substances as reflected by the amount of emissions from the source or category of sources, and the reduction in risk which can be attributed to each airborne toxic control measure.
- (6) The availability, suitability, and relative efficacy of substitute compounds of a less hazardous nature.
- (7) The potential adverse health, safety, or environmental impacts that may occur as a result of implementation of an airborne toxic control measure.

This requirement applies to acrolein and polycyclic organic matter, both of which appear on OEHHA's List. For diesel PM, several additional control measures will be developed and proposed for adoption to the Board. The ARB staff will also update the needs assessment report for dioxins to include the information from the special monitoring and testing study currently underway. The report will identify any additional emission reductions that are necessary. Staff will also complete a separate needs assessment for lead (lead was originally one of several metals in the 1993 the Non-Ferrous Metal Melting ATCM ) and determine if additional controls are necessary. Discussed below are projected timeframes for the completion of the needs assessments and adoption of control measures, as appropriate, by substance.

**Acrolein** is present in motor vehicle exhaust, tobacco smoke, wood smoke and some industrial emissions, and is used as an herbicide in irrigation canals. It can also be formed in the atmosphere from chemical reactions involving 1,3-butadiene, another pollutant present in motor vehicle and industrial emissions. A needs assessment is currently being drafted by ARB staff and is scheduled to be completed by July 2004.

**Diesel PM:** A needs assessment and four ATCMs have already been adopted or considered for adoption for diesel PM (see Accomplishments above). Additional control measures for the categories listed below are planned to go before the Board for consideration in the next two years.

- Fuel Delivery Cargo Tankers
- Portable Diesel Engines
- On-Road Public Fleets
- Off-Road Public Fleets
- Heavy-Duty Diesel Truck Idling
- Marine Vessels

**"Dioxins"** includes two families of extremely toxic chemicals: polychlorinated dibenzo-*p*-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). Dioxins are highly toxic chemicals that are formed during the combustion of materials and the manufacture of certain chlorinated chemicals. Dioxins can be emitted from a variety of sources including cars and trucks, waste incineration, chemical manufacturing plants, and other industrial sources that burn fuel. These toxic chemicals can be inhaled directly or can contaminate vegetation and be eaten by animals and humans. Dioxins then accumulate in the body. The ARB developed a needs assessment and adopted a control measure for dioxins in 1990. Pursuant to the requirements of Senate Bill 25, the existing control measure affecting dioxin emissions was reviewed and no revisions were recommended (see above). Currently, the ARB is undertaking a comprehensive air quality monitoring and stationary source testing program to collect ambient data for dioxins, furans, and dioxin-like polychlorinated biphenyls (PCBs) in California. This "dioxin" monitoring and testing program is scheduled to last through Spring 2004. The data will be then be used to update the needs assessment report and identify additional control measures, if necessary.

**Lead** is a toxic metal that occurs naturally in the earth's crust. It exists in combination with organic and inorganic compounds. Lead compounds are used in a variety of sources, including

construction materials, electronic devices, ammunition, batteries, and in certain ceramics and plastics. Airborne lead levels have decreased dramatically in recent decades, primarily due to the ban on leaded gasoline. Inorganic lead was identified as a toxic air contaminant in 1997. The 1993 ATCM to reduce toxic metal emissions, including lead, from metal melting operations, was reviewed and no revisions were found to be necessary (see above). Because the Metal Melting ATCM was done for a variety of toxic metals the ARB decided to prepare a needs assessment report specifically for lead which is scheduled to be completed by July 2004.

**Polycyclic Organic Matter (POM)** consists of a family of more than 100 chemicals containing more than one benzene ring and a boiling point of greater than 100°C. POM can be divided into the subgroups of polycyclic aromatic hydrocarbons (PAHs) and PAH-derivatives. They are produced by the combustion of fossil fuels, vegetable matter and other carbon-based materials. POM is present in exhaust from diesel- and gasoline-powered motor vehicles, fireplace smoke, tobacco smoke, and emissions from paper mills, industrial machinery manufacturing plants, and petroleum refineries. A needs assessment is currently being drafted by ARB staff and is scheduled to be completed by July 2004.

#### **d. Program Benefits to Children's Environmental Health**

A benefit of the review and adoption of ATCMs is reduced exposure to toxic air contaminants that adversely impact children. Airborne toxic control measures are adopted based on reducing the level of emissions to the lowest level achievable through the application of best available control technology (BACT) or a more effective method. The review of existing control measures will assure that BACT, or the most effective method, is being required in light of the development of new technologies. For TACs where no control measures exist, the actions outlined above will put regulations in place, if appropriate, to reduce emissions of the TACs that make infants and children more susceptible to illness.

#### **e. Recommendations**

Continued support of this program is recommended because it provides new information to regulatory agencies and better protects infants and children from exposures to air pollutants. Where a needs assessments shows that additional control measures can be taken to further reduce exposures, adoption of those measures is recommended.

## II. California's Children's Environmental Health Initiative (AB 2872)

### A. Development of Children's Cancer Risk Assessment Guidelines

#### 1. *Purpose and Requirements of the Legislation*

The purpose of this legislation was to direct the OEHHA to review existing state and federal cancer risk assessment guidelines for adequacy in addressing carcinogenic exposures to the fetus, infants, and children, and to develop, finalize, and publish children's cancer guidelines that are protective of children's health.

##### a. Review Cancer Risk Assessment Guidelines

The OEHHA is required to review cancer risk assessment guidelines (HSC § 901 (b) ) for use by the Office and the other entities within the California Environmental Protection Agency (Cal/EPA) to establish cancer potency values or numerical health guidance values that adequately address carcinogenic exposures to the fetus, infants, and children. (Due June 30, 2001). OEHHA is required to review existing state and federal cancer risk guidelines, as well as new information on carcinogenesis, and shall consider the extent to which those guidelines address risks from exposures occurring early in life (HSC § 901 (c)). (Due June 30, 2001)

##### b. Develop Criteria for Carcinogens, Assess Methods, Publish Guidelines

HSC § 901 (d)(1) requires OEHHA to develop criteria for identifying carcinogens likely to have greater impact if exposures occur early in life. (Due June 30, 2001). OEHHA is also required to assess methodologies used in existing guidelines to address early-in-life exposures (HSC § 901 (d)(2)) (Due June 30, 2001). In addition, OEHHA is required to construct a database of animal studies to evaluate increases in risks from short-term early-in-life exposures (HSC § 901 (d)(3)) (Due June 30, 2001). And, finally OEHHA is required to finalize and publish children's cancer guidelines that shall be protective of children's health (HSC § 901 (e)). (Due June 30, 2004)

#### 2. *Accomplishments for January 1, 2002 – December 31, 2003*

OEHHA staff completed the review of existing federal and state cancer risk guidelines, including the DHS' "*Guidelines for Chemical Carcinogen Risk Assessments and Their Scientific Rationale*, November 1985," the U.S. Environmental Protection Agency's (U.S. EPA) "*Guidelines for Carcinogenic Risk Assessment*, 1986," the U.S. EPA's "*Proposed Guidelines for Carcinogenic Risk Assessment*, April 1996," and the U.S. EPA's July 1999 preliminary draft document "*Guidelines for Carcinogen Risk Assessment*." The extent to which any of these guidelines addresses exposures early in life is extremely limited, with the exception of the U.S. EPA's July 1999 draft revised guidelines. While children are generally recognized as a potential sensitive population, no guidance on quantitative approaches to the assessment of risk to children or infants is provided, again, with the exception of the U.S. EPA's July 1999 draft revised guidelines. The July 1999 draft revised guidelines address the need for dose adjustments (from adults to children) when estimating cancer risks from children's exposures by certain routes, but

do not provide guidance on age-dependent adjustments for differential responses of individuals exposed early in life. The July 1999 draft revised guidelines were revised by the U.S. EPA.. OEHHA has evaluated the revised guidelines and plans to use these guidelines as a starting point for developing interim cancer risk assessment guidelines under SB 25 (see Section I.C.).

An initial version of the criteria for determining carcinogens that might have greater impact if exposure occurs early in life has been developed. The criteria are based on review and evaluation of data from human and animal studies demonstrating that exposures early in life cause more cancer than exposures as adults. These preliminary criteria will be refined and extended as OEHHA's analyses of the relevant data continue.

The current default mathematical models employed by existing cancer guidelines for use in estimating excess cancer risk do not address the possibility that the lifetime risk from early-in-life exposures may differ from that associated with exposures occurring in adulthood. There is a need for such methodologies to be developed, tested, and validated.

Two databases have been constructed to evaluate increases in risks from early-in-life exposures. The first database was conceived, initiated, and constructed by OEHHA staff, and is intended to facilitate the analysis of studies of carcinogens administered to animals during different periods of life. Over 1000 individual studies have been identified that potentially provide adequate data for comparison of cancer risk following administration of carcinogenic agents at different periods, e.g., pre/perinatal, childhood, and adulthood. Because of the large number of potential studies that address early life exposures, OEHHA's efforts to enter information into this database have been focused initially on studies of specific chemical classes and mechanisms of carcinogenic action.

The second database that OEHHA is employing was obtained, adapted and updated through a contract with the University of Massachusetts. This database compiles all studies where a single dose of a chemical was given at a certain age. Different dose groups given chemicals at different ages (e.g., newborn, 2 weeks, adolescents) can be compared to examine sensitive age windows. This database allows for an evaluation of these studies over numerous parameters important to tumor outcome.

### ***3. Planned Activities for the Next Two Years***

Efforts are currently underway to assess and characterize the effect of early age of exposure on lifetime excess cancer risk for different carcinogens. These efforts will lead to the development of the children's cancer guidelines. The children's cancer guidelines are scheduled for completion by July 1, 2004. With budgetary constraints in the last and current fiscal years, it is unlikely that OEHHA will be able to meet this scheduled deadline.

A voluminous scientific literature still needs to be evaluated, compiled, and analyzed to assure that the children's cancer guidelines developed by OEHHA reflect the most current scientific knowledge regarding the effect of age of exposure on lifetime cancer risk. Specifically, activities that are continuing include:

- Continue to review the voluminous scientific literature on studies of cancer resulting from exposures at different stages of life.
- Continue to review and evaluate relevant studies comparing effects of exposures to cancer-causing chemicals early and later in life, extract salient data, and incorporate into databases constructed for this purpose.
- Analyze and construct biostatistical models of age-dependent effects of carcinogens, extracting key information from the two databases developed (or adapted) by OEHHA.
- Draft proposed guidelines protective of the fetus, infants, and children, for chemical carcinogenic risk assessment that incorporate project findings and statistical models.
- Continue to develop guidance and new methodologies related to specific aspects of children's cancer risk.
- Continue to evaluate toxicity criteria and standards for regulated carcinogens, with the goal of ensuring that children are adequately protected.

#### ***4. Program Benefits to Children's Environmental Health***

Through OEHHA's continuing systematic and disciplined effort, early-in-life exposures to specific classes of chemicals will finally be addressed in a structured and vigorous manner. While great uncertainty persists among the public and scientific community regarding the extent and nature of the effects from early-in-life chemical exposures, this project has the potential to greatly add to our ability to address and answer questions about these fundamental carcinogenic mechanisms. These guidelines will form the foundation for cancer risk assessment policy that accounts for early-in-life exposures and is protective of the fetus, infants and children. Eventually, the interim cancer risk assessment guidelines to protect infants and children being developed under SB 25 (see Section I.C.) will be replaced by guidelines reflecting this very in-depth analysis of data on early-in-life exposure.

#### ***5. Recommendations***

Continued support of this key children's health initiative is imperative.

## **B. Contaminants of Greatest Potential Health Concern at Schools**

### ***1. Purpose and Requirements of Legislation***

The Office of Environmental Health Hazard Assessment is charged with identifying chemicals found at schools that may be of particular concern to children under AB 2872 (HSC § 901).

On or before January 1, 2002, the Office, in consultation with the appropriate entities within the California Environmental Protection Agency, shall identify those chemical contaminants commonly found at school sites and determined to be of greatest concern based on criteria that identify child-specific exposures and child-specific physiological sensitivities. On or before December 31, 2002, and annually thereafter, the office shall publish numerical values for five of those chemical contaminants. These two mandates are discussed below.

### ***2. Accomplishments for January 1, 2002 – December 31, 2003***

#### **a. Identifying Contaminants of Concern**

Health and Safety Code § 901(g) stipulates that OEHHA, by January 1, 2002, will identify those chemical contaminants that are commonly found at school sites; and determined to be of greatest concern based on criteria that identify child-specific exposures and child-specific physiological sensitivities. In carrying out the mandate during 2000 and 2001, OEHHA performed a broad review of federal and state programs to identify relevant monitoring data regarding the presence of chemical contaminants at school sites, and searched scientific review articles on children's health to identify applicable studies concerning child-specific physiological sensitivities to environmental contaminants. While OEHHA could not identify a list of chemicals that are specific for school sites and for which children have unique physiological sensitivities, OEHHA has identified two groups of candidate chemicals that encompass the mandate. The first are common environmental chemical contaminants and likely to be found at school sites (comprising approximately 200 chemicals), and another is a compilation of chemicals that scientific reviews have reported as having the potential to cause adverse effects on school-age children (approximately 190 chemicals). OEHHA issued a Final Report entitled "Development of Health Criteria for School Site Risk Assessment Pursuant to Health and Safety Code 901(g): Identification of Potential Chemical Contaminants of Concern at California School Sites" in June 2002, summarizing its efforts in identifying contaminants of concern. This report is available on the OEHHA website at <http://www.oehha.ca.gov/childrenshealth>.

The creation of these compilations of chemicals has facilitated the development of numerical health-based criteria discussed in the next section. This programmatic element provides a system to identify high priority chemicals so that numerical health criteria can be developed expeditiously for application in school-site risk assessment. The lead time required for developing health-based criteria certainly argues for working from these candidate chemicals, rather than waiting years for complete school-site monitoring and scientific studies on children to complete a definitive list of chemical contaminants that are found at school sites and determined to be of greatest concern based on child-specific physiological sensitivities.



The first compilation of chemicals, which defines the boundaries of what are likely to be found at school sites, is based on the following inclusive criteria:

- All pertinent sources and environmental media affecting the school setting should be considered.
- Chemicals, which have been targeted by federal and state agencies for monitoring in the pertinent environmental media (air, water, soil) and are likely to be found at school sites, should be considered.

Using these boundary criteria, OEHHA considers the following as candidate contaminants that are likely to be found at school sites:

- Eighty-six soil contaminants that have been reported in school site Preliminary Endangerment Assessments and reviewed by Department of Toxic Substances Control (DTSC). These soil contaminants are found at prospective school sites and are likely to be found at existing school sites.
- Eighty-seven Toxic Air Contaminants (TACs) that were emitted to, or detected in, California's ambient air. They are used as a proxy to represent potential contaminants that may be found in the outdoor air at schools.
- Sixty potential classroom contaminants targeted for monitoring by Department of Health Services (DHS) and Air Resources Board (ARB), as part of their Portable Classroom Study.
- Forty-seven toxic chemicals targeted by U. S. Environmental Protection Agency (U.S. EPA) in its National Human Exposure Assessment Survey (NHEXAS) and twenty-six contaminants targeted by U.S. EPA in its Total Exposure Assessment Methodology (TEAM) studies because of their persistence in the environment. These chemicals are deemed likely to be found in various environmental compartments at schools, as well as their surrounding communities.

The second compilation of chemicals, which outlines the boundaries for chemicals with potential child-specific sensitivities, is based on the following criteria:

- Have one or more citations in the scientific literature (as indexed by National Library of Medicine's online database and Pub Med) when searched for chemically-induced adverse effects on the nervous, respiratory, reproductive, endocrine, or immune system, or are associated with cancer during early development and childhood. These organ systems are targeted because they are characterized by having sensitive periods, or critical windows, of cell proliferation, migration, and differentiation during childhood when chemical insults may produce adverse effects at relatively low doses. These effects may not be recognized until maturity.
- Have been identified as a Proposition 65 Developmental and Reproductive Toxin by OEHHA.

OEHHA's compilations must be viewed as a living document, which will require additions and removals as more data become available. An attempt was made to include all reasonable candidate chemicals in the initial compilations, but ongoing literature reviews and results from

studies conducted by other Cal/EPA boards and departments may yield additional candidate chemicals. Conversely, the compilations may include chemicals where sufficient information will be obtained to conclude there is no differential effect on children, or the chemicals may be found not to occur commonly at schools. The working compilations of chemicals will serve to direct data-gathering and in-depth literature review, and to facilitate the prioritization of chemicals for evaluation for health-based criteria development.

**b. Development of Numerical Health Guidance Values Pursuant to Health and Safety Code Sec. 901(g)**

AB 2872 (HSC § 901(g)) stipulates that OEHHA will develop numerical health-based guidance for five of the chemicals listed each year until the list is exhausted. Pursuant to this task, in early 2002, OEHHA selected a subset of twenty chemicals that appear on both of the candidate compilations for further evaluation. The twenty chemicals were evaluated to determine if there was sufficient data on critical toxic effects in children's developing organ systems to scientifically support development of child-specific numerical guidance values. To that end, the following selection criteria were proposed:

- 1.) Chemicals having the strongest indication of being present at school sites.
- 2.) Chemicals with the strongest evidence of possible developmental, neurological, immunological, respiratory, reproductive, or endocrine effects.
- 3.) Chemical carcinogens with an existing non-cancer reference dose (RfD) that approximates the dose associated with a  $10^{-4}$  (one in ten thousand) to  $10^{-6}$  (one in a million) cancer risk and that is based on toxicity studies in adult animals.

In a separate task, OEHHA is developing a cancer evaluation methodology for children pursuant to HSC § 901(e). Because that methodology will not be available until 2004 at the earliest (see Part A 3 this section), initial efforts are focused on evaluating the non-cancer effects of chemicals. Cancer endpoints will be evaluated when the children's cancer risk assessment methodology is developed. Therefore, the third criterion helps identify those chemicals for which data from recent studies on juvenile animals suggest they might be toxic to children at lower exposure concentrations than they are to adults as significant carcinogenic risks.

After a preliminary review of the scientific literature on these twenty chemicals, OEHHA selected five for in-depth evaluation during 2002. They are cadmium, chlordane, heptachlor/heptachlor epoxide, methoxychlor, and nickel. In order to be efficient, recent scientific evaluations by other agency programs were used to complement this review. The scientific data suggest that children would have greater physiological sensitivities to these chemicals. Accordingly, OEHHA has proposed child-specific reference doses (chRD) for them.

OEHHA documented the rationale for these chRDs in a draft report, "Development of Health Criteria for School Site Risk Assessment Pursuant to Health and Safety Code Section 901(g): Proposed Child-Specific Reference Doses (chRDs) for School Site Risk Assessment – Cadmium, Chlordane, Heptachlor-Heptachlor Epoxide, Methoxychlor, and Nickel" and published it on the OEHHA website for public comment in June 2003. OEHHA also held a public workshop to discuss the report and receive comments in July 2003. This report is available on the OEHHA

website at <http://www.oehha.ca.gov>. OEHHA is currently addressing comments and will publish and post them on its website. Pursuant to external scientific peer review regulatory requirements, OEHHA requested the University of California to review and comment on the draft document. The peer review is in progress.

OEHHA staff gave two poster presentations at national scientific meetings on the rationale for developing chRDs and the proposed guidance values for these five chemicals in order to: 1) inform other scientists about the studies in young animals which indicate that some common chemical contaminants are toxic to children at lower doses than they are to adults; and 2) to discuss the studies and their implications. The presentation at the Society of Toxicology meeting in Salt Lake City, Utah, on March 10, 2003, was entitled, "Development of Child-Specific Health Criteria for School Site Risk Assessment." The presentation at the Teratology Society Annual Meeting on June 23, 2003, was entitled, "Development of Health Criteria for Children for School Site Risk Assessment."

### ***3. Planned Activities for the Next Two Years***

#### **a. Refinement of the List**

OEHHA plans to review the compilations of chemicals with respect to recent monitoring data by other Cal/EPA agencies. In particular, OEHHA will consider additional candidates that DTSC has identified in its continuing Preliminary Endangerment Assessment reviews and that the Department of Pesticide Regulation has identified from pesticide use notification by school districts pursuant to AB 2260 (the Healthy Schools Act of 2000). Furthermore, ARB and DHS published their "Draft Report to the California Legislature on Environmental Health Conditions in California's Portable Classrooms" on July 18, 2003. OEHHA provided funding for a small component of the data collection activities for the latter report to obtain data chemical contaminants tracked into portable classrooms in dust. OEHHA will continue to review the analytical results from these studies to better define the most common classroom contaminants and to select chemicals for further health risk evaluation.

#### **b. Development of Numerical Health Guidance Values**

While the first set of five chemicals are undergoing public and external peer reviews, OEHHA has selected five more chemicals for in-depth evaluation after a preliminary review of the scientific literature on the remaining fifteen chemicals. Screening analyses indicate that scientific data exist to support the proposal of chRDs for these chemicals. OEHHA is conducting an in-depth evaluation on four of these chemicals and arranging for epidemiological resources internally to work on the fifth chemical. The evaluation results of second set of chemicals will also be released for public comment and external scientific peer reviews

In addition, OEHHA will address public and external peer review comments on the first set of chemicals in finalizing their corresponding chRDs.

#### ***4. Program Benefits to Children's Environmental Health***

By identifying chemicals of concern to children at school sites, OEHHA will better be able to manage exposures to children at school and make better informed decisions regarding siting of new schools to avoid exposures to toxic chemicals present in the environment.

#### ***5. Recommendations***

Continued support of this key children's health initiative is critical to ensuring a safer school environment.

## C. Children's Environmental Exposure Studies

### 1. *Portable Classroom Study*

In 2003, the ARB and the Department of Health Services jointly completed a comprehensive study on the environmental health conditions in California's portable classrooms.

#### a. Purpose and Requirements of the Legislation

The objectives of the California Portable Classrooms Study were to assess the statewide environmental health conditions in California's portable classrooms and to develop recommendations to remedy or prevent any problems identified. As specified in AB 2872 (Shelley, 2000) and Section 39619.6 of the Health and Safety Code, the ARB and DHS were required to evaluate the school ventilation systems and maintenance practices, assess indoor air quality, and identify any toxic contamination including molds and allergens, in California's classrooms. The ARB and DHS also were required to submit a final study report, including recommendations, to the Legislature. Additional information on this study can be found at: [www.arb.ca.gov/research/indoor/pcs/pcs.htm](http://www.arb.ca.gov/research/indoor/pcs/pcs.htm).

#### b. Accomplishments for January 1, 2002 – December 31, 2003

The study was conducted in two phases: first, questionnaires were mailed to teachers and facility managers at over 1,000 schools statewide; then, detailed on-site measurements of a variety of environmental factors were obtained at 201 classrooms in 67 schools statewide. The field work was conducted by Research Triangle Institute, under contract to ARB. Public workshops and meetings with key state agencies were held before and after the study was conducted. Staff also met individually with some school district personnel and portable classroom manufacturers.

ARB and DHS staff presented the draft report with findings and recommendations to the Air Resources Board members at their July 2003 meeting. The final report was finalized and forwarded for submittal to the Legislature in fall 2003. The study identified a number of environmental health problems in both portable and traditional (permanent site-built) classrooms that need improvement. Deficiencies included: inadequate ventilation, elevated air pollutant levels, excess noise, moisture and mold problems, and lack of maintenance. A small fraction of the classrooms had severe problems. Some of the specific findings included:

- Inadequate outdoor air ventilation and poor system maintenance in many classrooms.
- Background noise above current guideline levels in all classrooms.
- Indoor levels of formaldehyde exceeding OEHHA's guideline levels, and the one-in-a million excess cancer risk level, in nearly all classrooms.
- Elevated levels of lead and arsenic in the floor dust in some classrooms.
- Residues of numerous pesticides in the floor dust of many classrooms.
- Visible mold or evidence of moisture problems (e.g., high moisture content in the building materials, or water stains) in about one-third of the classrooms.

- Temperature and humidity levels outside the acceptable range in some classrooms.
- Inadequate lighting in some classrooms.

Most, but not all, of these problems were found more often in portable classrooms than in traditional classrooms. A number of recommendations were included in the report to address these problem areas (see below).

#### **c. Planned Activities for the Next Two Years**

The study is complete. The ARB and DHS will continue to work with school districts, portable classroom manufacturers, other state agencies, and interested parties to implement the study recommendations. The Relocatables Working Group, convened by the Division of the State Architect, is revising the specifications used by the State to purchase portable classrooms. With funding from the California Energy Commission, further data analyses will be conducted to examine the relationship of classroom indoor environmental quality to classroom ventilation and lighting characteristics. In collaboration with OEHHA, the potential health risks of floor dust contaminants, especially pesticides, will be further examined.

#### **d. Benefits to Children's Environmental Health**

The recommendations from this study will be used by the Governor, the Legislature, state agencies, school districts, portable classroom manufacturers, and others to take effective actions that will improve the learning environment in California schools. Most importantly, actions taken will directly benefit children by reducing health impacts from potentially unhealthful conditions in portable classrooms. By improving the environmental health and comfort conditions in portable classrooms, these actions will also facilitate improved academic achievement of the students as well as reduce teacher absences.

#### **e. Recommendations**

The Report to the Legislature includes 16 recommended actions to resolve the problems identified in the study. Most importantly, ARB and DHS recommend that school districts assure that school buildings fully meet all state regulations, especially those of Cal/OSHA related to ventilation, sanitation, and moisture intrusion. It is also recommended that schools undertake a facility self-inspection program similar to that of the Los Angeles Unified School District; and that the State and school districts establish a policy of incorporating "Best Practices" into the design, construction, operation, and maintenance of schools. Additionally, long-term, stable funding mechanisms should be developed for operation, maintenance, and repair of school buildings; state review of school plans and training programs should be increased; and state-level guidelines or standards for chemical exposure and noise levels in classrooms need to be developed. In general, California needs to transition from remediation (fix-and-repair) to a focus on prevention (improved operation and maintenance).

## ***2. Children's School Bus Exposure Study***

### **a. Purpose**

The Children's School Bus Exposure Study is a comprehensive study of children's exposures during bus commutes. It was funded by the Air Resources Board and conducted by researchers at the University of California, Riverside and Los Angeles campuses. Its purpose was to determine the range of children's exposures, with an emphasis on those conditions potentially leading to high exposures, and to determine the factors most important in producing high exposures. Real-time and integrated measurements of pollutant concentrations were conducted inside five conventional diesel school buses as well as a diesel bus outfitted with a particulate trap and a bus powered by natural gas. Measurements were made on actual bus routes in Los Angeles, including at bus stops and at school loading zones.

### **b. Accomplishments for January 1, 2002 – December 31, 2003**

A pilot study was conducted in the Spring of 2001 and the main study was conducted in the early summer of 2002. The final report was completed and approved in the summer of 2003, study results were released in October 2003.

Major findings of the study included:

- Exposures to diesel-vehicle related pollutants (DRPs) on board conventional (uncontrolled) diesel school buses were significantly higher than roadway pollutant concentrations alone would indicate. This was largely due to "self pollution," or the intrusion of the buses own exhaust into the cabin after leaving the exhaust pipe. The effect was worse when the windows were closed and worse for older buses. DRPs on conventional diesel buses were up to 2.5 times higher when windows were closed.
- The influence of other traffic was also a key determinant of exposure. With the windows open, DRP concentrations were two to three times higher on the congested urban route compared to the less congested suburban/rural route.
- Cleaner buses showed lower exposures. The CNG-powered bus and the particulate trap-equipped bus showed significantly reduced on-board concentrations of DRPs compared to conventional diesel buses. With the windows closed, the DRP concentrations were two to five times higher on conventional diesel buses compared to the cleaner buses.
- Almost all exposure occurred from commuting on the bus, and not from loading and unloading, due to lower concentrations and relatively short times spent in boarding and de-boarding activities.

### **c. Planned Activities for the Next Two Years**

An additional ARB-funded study will be conducted to help determine how and under what conditions self-pollution occurs on conventional diesel school buses, with a goal of determining cost-effective inspection and mitigation measures.

#### **d. Benefits to Children's Environmental Health**

Results of the study are being used to quantify children's exposures to air pollution during their school bus commutes and to evaluate the associated health risks. Results will be used to better guide the ARB's efforts to reduce children's exposure to air pollution, especially their exposure to diesel exhaust particulate matter.

#### **e. Recommendations**

Recommendations to reduce school bus-related exposures include:

- Replacing conventional buses with alternate fuel or particulate trap-equipped buses.
- Minimizing bus caravanning by staggered departure times and driver avoidance of other buses.
- Using cleaner buses on longer routes.
- Minimizing idling time at schools (now required by California regulation).
- Whenever the bus is not full, encouraging children to sit in the front of the bus where concentrations are sometimes lower.
- Maintaining school buses to eliminate or reduce visible exhaust.

### ***3. Health Affects of Recycled Waste Tires in Playground and Track Surfacing***

#### **a. Purpose and Requirements of the Legislation**

Resolution 2003-359 CIWMB – Evaluation of the Health Affects of Recycled Waste Tires in Playground and Track Products – resulted from stakeholder and public input during public comment meetings on the Five-Year Plan for the Waste Tire Recycling Management Program. Because children spend considerable time at playgrounds, those entities that fund, install, own, and maintain playground equipment have a heightened public health responsibility to assure that those structures do not pose safety or toxicologic hazards. Parents remain concerned about these hazards since each year thousands of California children are injured at playground to the degree that they require a hospital visit, and because of the pervasive use of wooden playground equipment treated with wood preservatives, such as copper-chromate-arsenic (CCA), which contains a known carcinogen. Although somewhat infrequent, some parents expressed their concerned about the structural and toxicologic safety of playground matting materials made from recycled tires. Recognizing these concerns and open questions, the Board took the responsible action of funding an independent review from the Office of Environmental Health Hazard Assessment (OEHHA) of these materials as used in playground structures and surfaces to answer the safety and toxicological questions.

#### **b. Accomplishments for January 1, 2002 to December 31, 2003**

Under contract to the CIWMB, OEHHA initiated a review of the scientific and technical literature. OEHHA conducted a data call-in to gather all of the published information regarding the



chemical content and degradation products of recycled tires. OEHHHA also contacted the recycled tire association and manufacturers to obtain unpublished information that will help in understanding the chemical content of tires to which children might be exposed from their use in playground materials. From this information, OEHHHA will formulate a laboratory analytic plan to address issues of children's potential exposures from playing on structures having recycled tire content.

#### **c. Planned Activities for the Next Two Years**

CIWMB will sponsor laboratory and field studies and a dermal and inhalation exposure assessment. A technical report will be drafted, public comment will be sought, the draft report will be peer reviewed, revised as necessary and presented to the Board for approval.

CIWMB staff has received inquiries from the public regarding the possible adverse health affects of playgrounds, tracks and other recreational surfaces made from waste tires. For instance, people have specifically asked what happens if tire shreds were to be ingested by children. Concerns such as this have become a barrier for school districts considering the use of rubberized recreational material. A complete evaluation of the basic health and safety questions of these waste tire-containing products will assist decision makers in making an informed choice. The CIWMB will also do a complete evaluation of the physical benefits of these products, so that both the risks from exposures (if any) can be weighed against the benefits of reduced physical injuries. The evaluation with recommendations will be completed in May of 2005.

#### **d. Program Benefits to Children's Environmental Health**

Rubberized playground equipment and surfacing materials have the potential to reduce physical injuries to children. Finding better uses for waste tires also reduces their threat as a breeding place for mosquitoes and other vectors of harmful diseases such as West Nile Virus and malaria.

#### **e. Recommendations**

Whenever large amounts of new materials and/or products are introduced into the school environment, studies should be performed to ensure that they do not pose a greater risk than the products or conditions they are meant to replace or improve upon.

## D. School Site Programs

### 1. *Guidance for Risk Assessment at Schools*

#### a. Purpose and Requirements of the Legislation

The mandate for producing guidance for risk assessment at schools is found in Section 901(f)(1) of the California Health and Safety Code, which states that "On or before December 31, 2002, the Office shall publish a guidance document, for use by DTSC and other state and local environmental and public health agencies to assess exposures and health risks at existing and proposed school sites. The guidance document shall include, but not be limited to, all of the following:

- 1.) Appropriate child-specific routes of exposure unique to the school environment, in addition to those in existing exposure assessment models.
- 2.) Appropriate available child-specific numerical health effects guidance values and plans for the development of additional child-specific numerical health effects guidance values.
- 3.) The identification of uncertainties in the risk assessment guidance and those actions that should be taken to address those uncertainties."

#### b. Accomplishments for January 1, 2002 to December 31, 2003

In collaboration with the Department of Toxic Substances Control, OEHHA has developed draft guidance for multimedia, multi-pathway, risk assessment for existing and proposed school sites (Guidance). The Guidance has been through external peer review and public review and comment. Comments and their responses have been appended to the Guidance. The equations in the Guidance have been incorporated into an Excel® spreadsheet that will facilitate compliance with the Guidance. The current version of the spreadsheet will be released along with the Guidance, but development of an improved version is underway.

The school environment is a unique exposure setting, which requires an additional set of exposure parameters. For example, the ages and activity patterns of the people who attend and work at schools may differ from other typical occupational or residential settings. OEHHA evaluated the availability of data to support school-specific exposure parameters. Finding data lacking in some areas, OEHHA partnered with the Air Resources Board and the Department of Health Services to gather data on characteristics of California schools that are relevant to exposure assessment. For example, as a result of studies co-sponsored by OEHHA, parameter values were developed for outdoor-to-indoor transport of soil constituents, outdoor-to indoor air exchange rates, and annual days of instruction.

Exposure pathways and scenarios at schools are a subset of the pathways operating in other settings. The draft guidance considers exposures that could occur from these sources:

- Children can be directly and indirectly exposed at school to contaminants originating in soil. Vapors emitted from contaminated soil at the school site can be inhaled indoors and outdoors.

- Children can be exposed to soil contaminants by direct contact with contaminated outdoor soil or with soil particles transported into school buildings via of aerosols or by tracking of soil particles into buildings on shoes and other vectors.
- Soil particles can be entrained into aerosols that can be inhaled indoors and outdoors.
- Contaminated shallow aquifers underneath school property can release volatile chemicals into the air.
- Chemicals absorbed by nursing mothers can partition into their milk.

For residential settings, soil and dust ingestion rates by children and adults have been estimated by U.S. EPA. However, there are no estimates specific to the school environment, and no generally accepted method is available to estimate the fraction of the daily exposure that comes from indoors versus outdoors. Basic research in the area of soil and dust ingestion in the school setting is beyond the scope of this project. The draft guidelines assume that soil and dust ingestion at school will be proportional to fractional time spent at school.

Interior dust is a potentially important exposure medium for school site exposure assessment because students typically spend much of their time at school in classrooms and other indoor areas. To estimate the fraction of dust that comes from site soil, OEHHA co-sponsored studies comparing the concentration of tracer elements in school site soil and interior dust vacuumed from carpets and floors. The results of this study suggest that contaminants may be twice as concentrated in interior dust as in outdoor soil. The validity of estimates based on this methodology depends on the absence of non-soil sources of the tracer elements in interior dust and on the extent to which the contaminants of concern behave like the tracer elements. The fraction of total dermal loading contributed by soil versus interior dust is presumed to be proportional to time spent outdoors and indoors respectively. Data and models are available to estimate dermal loading and dermal uptake, although they are not specific to schools.

Vapor-phase contaminants may be inhaled indoors or outdoors. Indoor vapor concentrations are estimated using EPA's adaptation of the Johnson and Ettinger model. Outdoor vapor concentrations are estimated using EPA's Soil Screening Guidance. Contaminants in or on respirable particles may also be inhaled indoors or outdoors. The atmospheric loading of outdoor suspended particles that come from site soil are estimated using methodology adapted from the U.S. EPA's Soil Screening Guidance. Indoor suspended particle concentrations are assumed to be the same as the concentrations in indoor dust. The ratio of time spent indoors to time spent outdoors is significant because the concentrations of contaminants in indoor air and dust may differ from the corresponding outdoor concentrations. Also, activities and breathing rates may differ between indoor and outdoor environments.

### **c. Planned Activities over the Next Two Years**

When final, the guidelines can be used to assess chemical exposure and risk at existing and proposed school sites, their widespread use in a uniform manner will be facilitated by the availability of an easy-to-use spreadsheet that accurately reflects the guidance. To this end,

OEHHA intends to investigate possible improvements to the mathematical adaptation of the Excel® spreadsheet (the SchoolScreen model). These include, but are not limited to: writing macros that will facilitate populating the model inputs from the databases for chemical properties, running the model, and then repopulating for a second chemical, etc. The results of these calculations would be collated and summarized in tabular form for the end-user.

#### **d. Program Benefits to Children's Environmental Health**

Guidelines for conducting risk assessment at school sites will facilitate consistent assessment of potential risks of exposures to toxic chemicals in the school environment. In turn, this would support better decisions regarding siting of new schools to reduce or avoid such exposures.

#### **e. Recommendations**

Continued support of this key children's health initiative is imperative to ensure there is adequate assessment of potential and existing school sites.

### ***2. Evaluating Risks at School Properties***

#### **a. Purpose and Requirements of the Legislation**

Since January 1, 2000 the Department of Toxic Substances Control (DTSC) School and Property Evaluation and Cleanup Division has successfully supported the statewide effort to increase the number of schools and classrooms in California, while protecting children and staff from the potential effects of exposure to hazardous substances. In January 2000, two new laws on school construction became effective: Assembly Bill (AB) 387 and Senate Bill (SB) 162, which added Sections 17072.13, 17210, 17210.1, 17213.1 - 17213.3 and amended Sections 17070.50 and 17268 of the Education Code. These statutes require the involvement of DTSC in the environmental review process for the proposed acquisition and/or construction of school properties, including expansions and additions, where state funding is utilized. These new laws address concerns raised by parents, teachers, local communities, and the Legislature over school properties that are or may have been contaminated by hazardous materials and thereby pose a potential health threat to children and staff. Initially, the concerns were focused on several school projects in the Los Angeles Unified School District, including the Belmont Learning Center (now known as Central Los Angeles High School #11/Vista Hermosa) and Jefferson New Middle School (now known as Los Angeles Academy). Discussions were expanded to include all school districts and the apparent lack of proper site assessment and review and approval by environmental agencies. The new laws codified the process for environmental assessment and named DTSC as the lead agency for evaluating new and expanding school properties.

In addition to the evaluation of the presence of hazardous materials on the proposed school properties, the legislation expanded DTSC's authority to evaluate naturally occurring hazards,

such as petroleum deposits and naturally occurring asbestos. DTSC also evaluates other hazards not traditionally considered hazardous materials, such as methane generation from oil fields, former dairy properties, and landfills. All of these considerations have been incorporated into a comprehensive approach developed by DTSC for evaluation, mitigation, and approval of new school sites.

**b. Summary of Accomplishments from January 1, 2002 through December 31, 2003**

The DTSC School Property Evaluation and Cleanup Division (Schools Program) provides regulatory oversight for the environmental review of school sites. Because of the legislatively mandated review time for different phases of the site investigation, a highly efficient, creative, and dedicated scientific team is assigned to each project. Included in this team are environmental scientists, engineers, geologists, toxicologists, and public participation specialists. The Schools Program has utilized a team approach for expediting review, approval, and remediation of sites. Branches of this program are located in DTSC offices in Sacramento, Glendale, and Cypress.

In order to facilitate the implementation of this new program, the Schools Program and DTSC Human and Ecological Risk Division managers have participated in monthly coordination meetings with representatives from the Department of Education (CDE) and the Coalition for Adequate School House (CASH). CASH is a lobby group representing over 1000 school districts, architects, attorneys, construction managers, consultant and facility planners, contractors and developers, and financial institutions. Topics of discussion have included sampling guidance and protocols prepared by DTSC, timeframes and costs for environmental reviews, structure and content of the Environmental Oversight Agreements, pending legislation, and other issues of concern to local school districts. These meetings have resulted in improved coordination, cooperation, and communication between school districts, CDE, and DTSC providing an avenue for school districts to work with state agencies to resolve any issues of concern. In order to facilitate outreach to school districts, DTSC has participated in over twelve workshops and conferences in both Northern and Southern California during 2002 and 2003, giving presentations on DTSC's site evaluation, risk assessment, and cleanup process.

***1.) School Site Review Process***

The school site review process is broken down into three components or steps. These steps follow the previous site evaluation process of the California Department of Education (Phase I and Phase II evaluations), with the addition of requirements of the California Health and Safety Code. A summary of the completed projects for each phase of the review process can be seen in the table at the end of this section.

**a.) Phase I Assessment**

The first step in the environmental oversight of proposed school sites is the historical review of the property in the Phase I Assessment. This assessment includes historical information on permits, business, and suspected and known uses of the properties, Sanford maps, and aerial

photographs. New regulations developed by DTSC's Schools Division were adopted into Title 22, California Code of Regulations, pursuant to Education Code Section 17210(g). These regulations establish guidelines for completing Phase I Environmental Assessments at proposed school sites under the Education Code to streamline the environmental review process. The Phase I Assessment is conducted in accordance with the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM Designation E 1527). The ASTM Standard was supplemented by the DTSC Phase I Environmental Site Assessment Advisory: School Property Evaluation (September 5, 2001) to address additional naturally occurring and anthropogenic sources of hazardous materials. DTSC reviews Phase I Assessments within a 30 day timeframe and makes a determination of either 'No Action' or 'Preliminary Environmental Assessment' is required.

#### **b.) Phase I Addendum**

The Phase I Addendum was added to the DTSC school site evaluation process in 2002 in order to simplify and help expedite projects where limited lead contamination was a possibility. The Phase I Addendum addresses the potential lead soil contamination around buildings from lead-based paint. The document is submitted after the Phase I Assessment and contains soil sampling results for lead in accordance with the Interim Guidance for Evaluating Lead-Based Paint at Proposed School Sites, July 23, 2001. If the results indicate lead in concentrations above the screening value, further action is required. This protocol is a departure from the requirement of a Preliminary Environmental Assessment for these lead-only sites, which has enable school districts to obtain funding faster and expedite the site assessment process.

#### **c.) Preliminary Environmental Assessment (PEA)**

For proposed school sites where known or suspected presence or releases of hazardous materials may have occurred or naturally occurring conditions warrant, a Preliminary Environmental Assessment is required. This assessment is based on the guidance document: Preliminary Endangerment Assessment (DTSC, 1994, revised 1999). The PEA is a focused-screening site investigation approach that is used for either a 'No Further Action' (NFA) or 'Further Action' determination. An NFA determination means that the school site either has no contamination or that any contamination levels are below a level of health concern. Further Action can require either the collection of additional environmental samples to determine the extent and significance of the problem and if a clean up action (remedial action) is warranted. The approach in the PEA is designed to maximize the possibility of determining the need for further action while minimizing the actual number of samples on the site. All PEAs are required to go through a thirty-day public notice and comment period, during which time a hearing is held by the local school district. Following this comment period, DTSC makes a final determination of the PEA.

#### **d.) Remedial Actions**

DTSC has required remedial actions on a number of proposed school sites in order to ensure a school setting that does not pose a significant health risk to the students and staff. Almost all of

the remedial actions required by DTSC have entailed soil removal with the exception of about a half dozen sites. These exceptions have included soil vapor extraction systems (primarily for methane), and mitigation of naturally occurring conditions. Many of the soil removal actions have been for lead contaminated soil from around structures where lead-based paint had been used. DTSC follows the State Superfund process for all remedial actions, which includes the notification, education, and input of the local affected communities. This public participation aspect of the process encourages the members of the community, the students and parents of the proposed school, and local and regional governmental agencies to provide feedback to DTSC before the final remedial decision is made.

#### e.) Summary of Projects

DTSC has reviewed over 1330 school projects since the legislation was implemented in January 2000. Since January 2002, DTSC has reviewed 584 school projects. During the current two year period, a number of projects went directly into the PEA phase, by-passing the Phase I Assessment. This strategy provided a cost and time savings to school districts for projects that a PEA was clearly needed. The following table is a summary of school projects for both the 2000-2001 and 2002-2003 two-year periods.

**Summary of Completed School Projects**

Project Phase	January 2000 – December 2001	January 2002 – December 2003
Phase 1	473	240
Phase I Addendum	0	5
Preliminary Environmental Assessment (PEA)	267	220
Removal Actions	12	58
Total Number School Projects	852	523
Number of School Districts	280	366

#### *2.) Evaluation of Proposed School Properties*

DTSC uses the screening risk assessment approach described in the PEA manual, which assumes the use of an unrestricted land use scenario, selection of chemicals of concern, and collection of background samples for inorganic chemicals. DTSC has included additional approaches for evaluating school sites in order to address a number of the unique environmental

challenges that have been encountered. Some of the basic assumptions and unique approaches are described in the following sections.

#### **a.) Unrestricted Land Use Exposure Scenario**

The PEA uses an unrestricted land use exposure scenario that is equivalent to a residential land use. The assumptions in this exposure scenario are that an individual lives on the site both as a child and as an adult. This screening approach provides an assessment of both exposures to children, assuming exposure parameters of a small child, as well as the long-term exposures to adults and older children. The unrestricted land use scenario has been used for a number of years in DTSC in determining appropriate remediation strategies for sites, as well as the necessity of placing deed restrictions or land use covenants on properties following remediation to prevent use of the property by sensitive populations. Sensitive end use has included residences, schools, day care centers, and hospitals. The unrestricted land use scenario has been, and will continue to be utilized by DTSC for decision-making purposes at proposed school sites. DTSC believes that the screening approach utilized in the initial site investigation and characterization of these properties is warranted and provides a protective and health conservative approach to evaluating risks to children.

#### **b.) School-Based Exposure Scenario**

A school child-specific exposure scenario is being developed by the Office of Environmental Health Hazard Assessment (OEHHA) with input from the DTSC Human and Ecological Risk Division (DTSC/HERD). This document is scheduled for completion by the end of 2003. In addition, child-specific toxicity factors will be evaluated for limited number of chemicals by OEHHA starting in 2002 which will eventually be utilized by DTSC in risk assessments for schools. The first five chemicals were completed in 2003 and the new child specific toxicity factors will be used in PEAs for school sites.

#### **c.) School Evaluation and Assessment Manual (SEAM)**

DTSC is currently developing the School Evaluation and Assessment Manual which will be a comprehensive approach for the environmental evaluation of school sites. The SEAM will include the Phase I, Phase I Addendum, a revised and updated Preliminary Environmental Assessment, Supplemental Site Investigation protocol, and an outline of the Removal Action Workplan process. In addition, the SEAM will have a section on a tiered approach for evaluating existing school sites.

#### **d.) Indoor Air**

Volatile organic compounds (VOCs) are commonly found on sites in urban areas. The source of VOCs can be from leaking underground and aboveground fuel tanks, solvent tanks and sumps, and contaminated groundwater from sources either on or off-site. Evaluation of VOCs is conducted using the Johnson and Ettinger Vapor Intrusion Model approved by U.S. EPA and modified by DTSC. This model is a conservative estimate of potential vapor intrusion and concentration in building interiors. VOC contamination can be found in the soil and in



groundwater. Both of these potential sources for vapor migration are evaluated as an addendum to the PEA guidance at proposed school sites. Input source concentrations can be used from soil gas, soil matrix, or groundwater data.

#### **e.) Agricultural Properties**

Many new schools have been proposed on properties that were formerly used for agricultural purposes. In most cases, these properties had legally-applied pesticides used in the process of crop production. DTSC developed a modified sampling strategy for evaluating properties with uniform pesticide application. The original guidance, Interim Guidance for Sampling Agricultural Soils (June 28, 2000), has been updated and reissued on August 26, 2002. The revision incorporated data and information that had been gathered over the previous two years and the experience learned from the several hundred former agricultural properties that had been evaluated in the Schools Program. The revised Guidance is a useful tool for school districts to focus and expedite their evaluation of potential school sites. The strategy maximizes the sampling coverage with a cost-effective approach utilizing selective composite sampling in crop areas. Focused, discrete sampling is applied in areas of pesticide mixing, loading, storage, or other areas of concern. Approximately 5% of the former agricultural sites have required some remediation of the soil because of pesticide residues. Most of these pesticides were organochlorine pesticides, with elevated levels of toxaphene being the most common pesticide requiring remediation. Arsenic contamination, associated with the use of arsenical pesticides, has also been frequently identified at these sites.

#### **f.) Arsenic**

Arsenic concentrations in background soils are particularly problematic, since background levels in many areas are above a screening excess lifetime cancer risk level of one in million ( $1 \times 10^{-6}$ ). Because of this, it is particularly important to determine if the observed arsenic levels on a site are naturally occurring background or if they are from an industrial or anthropogenic source. To help address this issue in the Los Angeles area, where many new schools are being proposed by Los Angeles Unified School District (LAUSD), HERD evaluated data from fifteen proposed LAUSD school sites that had been reviewed and approved by DTSC. From these sites, HERD compiled a data set of 589 soil samples of arsenic and then conducted a statistical evaluation. The upper tolerance limit (UTL) of the distribution is 5.9 parts per million (ppm) of arsenic. This approach is being used by DTSC to determine whether arsenic is a contaminant on other LAUSD sites. The document, Draft Background Metals at Los Angeles Unified School Sites–Arsenic, Department of Toxic Substances Control, March 14, 2003, is undergoing final revisions and approval. In addition to the background analyses for determining whether Arsenic is a potential chemical of concern at proposed school sites in the Los Angeles area, a strategy for developing clean-up goals is also being developed with the document. This strategy would combine overall distributions on a site, statistical analyses, including the upper 95% confidence limit, and lateral and vertical extent of any areas identified with arsenic values exceeding background levels.

### **g.) Naturally Occurring Asbestos**

Asbestos, a known human carcinogen, occurs naturally in ultramafic rock formations throughout California. Recent attention has been focused on the Sierra foothill area east of Sacramento, where several forms of naturally occurring asbestos have been found in the soil and rock outcroppings. DTSC has evaluated several schools in the Sierra foothills and recently completed remedial actions for naturally occurring asbestos at one existing and one proposed school site. DTSC is currently developing guidance for when evaluation of naturally occurring asbestos may be needed at a school site and how to conduct the investigation. DTSC is currently evaluating up to another dozen proposed school sites for naturally occurring asbestos, and DTSC anticipates that the number of school sites will increase during the next two years.

## **3.) *Special Projects and New Developments***

### **a.) Phase I Regulations**

Effective February 11, 2003, new regulations developed by DTSC's Schools Program were adopted into Title 22, California Code of Regulations, pursuant to Education Code Section 17210(g). These regulations establish guidelines for completing Phase I Assessments at proposed school sites under the Education Code to streamline the environmental review process. The regulations also provide procedures for submission of sampling and analysis results in Phase I Assessment or Phase I Addendum report for lead in soil from lead-based paint and/or PCBs in soil from electrical transformers. A fact sheet was prepared and posted on DTSC's website regarding these new regulations. The regulations were implemented by the Schools Program and school districts.

### **b.) Special Pilot PEA Projects to Assist Financially Disadvantaged School Districts**

Using funds available through the U.S. EPA Preliminary Assessment/Site Inspection Grant Program, DTSC completed Preliminary Environmental Assessments (PEA) for five proposed school sites. DTSC's pilot program benefited these school districts in several ways. The pilot program assisted financial hardship school districts which otherwise would not have been able to evaluate these sites. In addition, it demonstrated that through direct contractor oversight, DTSC can assist school districts in controlling investigation costs and improving project efficiency. The following is a summary of the Pilot Projects.

- *Proposed Paramount Elementary School, Southgate, Los Angeles County Department of Education*

The site had been occupied as the Rancho Basket Supermarket since 1960. Several service stations with leaking underground storage tanks and various auto repair shops are located directly across streets from this 3-acre site. DTSC issued a contract of \$45,000 to its zone contractor in April 2001. DTSC determined the adequacy of the draft PEA within 6 weeks after the issuance of the contract. Contractor completed the PEA at \$35,000 (approximately) with a saving of \$10,000. DTSC approved the final PEA with an 'No Further

Action' determination in July 2001 which was 3 months after the task order issuance, including the public comment period for the draft PEA held by the Department of Education.

- *Proposed Cockatoo Middle School, Hawthorne, Hawthorne Schools District*  
Two gas stations with know leaking underground storage tanks, a hotel, residential buildings and various auto repair shops have been on this 8-acres site. DTSC determined the adequacy of the draft PEA in September 2001, three months after the issuance of a contract of \$125,000 to the zone contractor. Contractor completed the PEA at \$85,000 (approximately) with a saving of \$40,000. DTSC finished the PEA with a 'Further Action' determination in December 2001 (only 6 months after the contract issuance, including the public comment period held by the school district).
- *Proposed Yorba Middle School, Chino, Chino Valley Unified School District*  
This 14 acres site was occupied for dairy operations. The adjacent packaging facility has encroached 60 feet 60 feet inside the site with a hazardous waste storage area. A contract of \$68,000 was issued to a DTSC contractor in September 2002. PEA Workplan was approved in November 2002. Field sampling activities were completed in December 2002. DTSC approved the PEA for public review in April 2003 (approximately 7 months after the issuance of the contract). DTSC approved the final PEA with an 'No Further Action' determination in early July 2003 (approximately 9 months after the issuance of the contract).
- *Proposed Lockeford Elementary School Expansion, Lockeford, Lodi Unified School District*  
This 3-acre site is currently occupied by a trucking company. Previous land uses include a train stop, railroad operations, a brick factory, a lumber shop, and a grain warehouse. A contract of \$75,000 was issued to a DTSC contractor in December 2002. A PEA workplan was approved in February 2003. Field work was completed in March 2003. DTSC approved the draft PEA for public review in June 2003 (approximately 6 months). The final approval with a 'No Further Action' determination was issued in early August 2003.
- *Proposed Urban Promise Academy, Oakland, Oakland Unified School District*  
This 4-acre site has been occupied for various commercial and industrial uses. A contract of \$99,993 was issued to Accord Engineering in March 2003. A PEA workplan was approved in April 2003. Field work was scheduled for late April 2003, but was not completed until June 19, 2003 (after an inspection warrant for site access was obtained from Alameda County Superior Court on June 11, 2003). DTSC approved the draft PEA in September 2003 for public review.

#### c.) U.S. EPA Grant for the Investigation of Organochlorine Pesticides in Residential Neighborhoods

Using federal grant funds acquired from U.S. EPA, DTSC completed an investigation for residual organochlorine pesticide contamination around buildings where pesticides may have been used for the control of termites. Chlordane and dieldrin were commonly used as termiticides until they were banned in the late 1980's. These and other organochlorine pesticides are considered to be possible human carcinogens and they are persistent in the environment. When older buildings

are scheduled to be demolished for new or expanding school construction, the question of possible residual pesticide contamination was raised. In order to determine if this was a potential problem in California, DTSC conducted evaluations of three prospective school sites. Each of these sites consisted of many residential buildings, and due to the age of the buildings, the presence of organochlorine pesticides was suspected. Chlordane was found in 95% of all of the surface soil samples, and other organochlorine pesticides were found in over half of the samples. In many cases, the levels of chlordane were high, and removal actions were required at all of the proposed school sites investigated in the study. The findings of the investigation support the need for testing soils around older structures for organochlorine pesticides.

**d.) Advisory: Methane Assessment and Common Remedies at School Sites**

Methane has been identified as an issue at a number of proposed and existing school sites. The source of methane can vary from oil fields to landfills to former dairy farms. In all of these situations methane concentrations in the soil underlying the sites have ranged as high as hundreds of thousands of parts per million. Since the lower explosive limit for methane is 50,000 ppm, the potential exists for migration of the methane to the surface creating potentially hazardous conditions. The presence of methane has required remediation strategies for number of school sites. DTSC has prepared the Draft Methane Assessment and Common Remedies at School Sites Advisory, September, 2003, to assist school districts and expedite the process for developing remedial systems.

**e.) PCB Advisory for Schools – How Voluntary Lighting Retrofits Can Address Hidden Dangers and Liabilities**

DTSC developed the *PCB Advisory for Schools, April 29, 2003* to assist school districts in addressing potential contamination from fluorescent light ballast containing PCBs (polychlorinated biphenyls). PCBs were commonly used in electrical light ballasts until their use was banned in 1978. PCBs persist in the environment and they are suspected human carcinogens. This Advisory alerts school districts to the potential hazards from aging PCB ballasts and provides guidance for identifying, managing, and removing PCB ballasts. The Advisory also provides information regarding the availability of DTSC oversight for management of PCB releases and cleanups. Additional funding resources for retrofit and waste disposal costs are also discussed such as energy assistance grants and school modernization bonds.

**f.) Advisory – Active Soil Gas Investigation**

On January 29, 2003, DTSC and the California Regional Water Quality Control Board – Los Angeles Region (LARWQCB) jointly issued the *Advisory – Active Soil Gas Investigations*. The Advisory was developed to ensure that consistent methodologies are applied during soil gas investigations to produce reliable and defensible data of high quality. The Advisory is designed to supplement the LARWQCB *Interim Guidance for Active Soil Gas Investigation (February 25, 1997)* which has served as predominant guidance for investigating sites with potential volatile organic compounds (VOCs) contamination in Southern California and much of the State for the last 10 years.

#### **g.) Guidance: Oil and Gas Field Investigations**

A number of areas in California, including Los Angeles, San Luis Obispo County, and Kern County, have significant underlying oil fields scattered throughout these areas. DTSC has developed a draft document on characterization of former oil fields. *Interim Draft Guidance for Characterization of Former Gas and Oil Field Exploration & Production Sites at Proposed School Sites (November 2002)* is currently under review and scheduled to be finalized in December 2003.

#### **h.) Database**

The Schools Program developed an extensive database for school site projects at DTSC. The database is accessible through the DTSC website ([www.dtsc.ca.gov](http://www.dtsc.ca.gov)) and it provides specific information on projects. The database is updated regularly with the status of the project as well as which chemicals are of concern for the site.

#### **4.) School Sites**

DTSC has provided oversight on over 580 school sites in the last two years and over 1330 school sites in the four years since January 2000 when the legislation was enacted. The following are examples of school projects which DTSC has been involved. These projects include new schools and additions, as well as existing schools where contamination was suspected or found. Please see the Section C, Emerging Issues, for a more detailed discussion on the environmental challenges facing existing schools.

##### **a.) Central Los Angeles High School #11/Vista Hermosa (formerly Belmont Learning Center), Los Angeles**

Since 1999, DTSC has been involved to ensure the completion of a comprehensive environmental investigation of this large high-profile project in downtown Los Angeles. Over the years, the site has been thoroughly investigated to address its location in the Los Angeles Oil Field. DTSC is currently reviewing the third draft Remedial Investigation/Feasibility Study prepared for the project. During these investigations, politics as well as science have lead to delays and changes in the project plans. The discovery of a minor earthquake fault on the site will result in demolition and set-back of some existing structures. The project plans now call for completion of most of the existing buildings, construction of two new buildings, athletic fields, and a 10-acre joint-use city park. Each area of the school campus will require various remedial measures to mitigate for the presence of methane and hydrogen sulfide in the subsurface. DTSC will continue to be closely involved in the review and oversight of the remedial design for the completion of the school.

##### **b.) Park Avenue Elementary School, Cudahy**

Park Elementary School was built on property that contained a landfill used for local industrial hazardous wastes, containing primarily petroleum related wastes and heavy metals. The

playground, as well as the adjacent park, is on top of the former landfill. The site came to DTSC's attention following reports of black, tarry-like substances surfacing on the playground in the late 1980's. An interim remediation was conducted at the school in the early 1990's with DTSC oversight, where some of the soils were excavated, a liner installed, several feet of clean fill placed on top of the landfill material, and vents installed. Additional investigations were conducted in 2000 and 2001. Excavation of landfill wastes and impacted soil was completed by October 2003. While DTSC has not been able to establish any current exposures at the school the community concerns about this school have been very high.

#### **c.) Jersey Elementary School, Santa Fe Springs**

Jersey Elementary School was built in the 1960's adjacent to an area that had contained waste water treatment ponds primarily for petroleum wastes. During the life of the ponds, wastes had routinely overflowed into the area that is now the playground of the school. A city park now overlies the original waste ponds. During trenching for footings for new portables in the playground in the spring of 2001, soils contaminated with oil/tarry wastes were encountered. DTSC was notified and the entire school was characterized during the summer 2001. Contaminated soils were found throughout the grassy playground area, although the remainder of the school was not contaminated. DTSC required remedial investigation and removal of the contaminated soil in the playground. A remedial investigation was completed in October 2001 and removal of contaminated soil was completed in August 2002. The site was certified in January 2003. Additional studies for the adjacent park are on going.

#### **d.) Laguna Nueva Elementary School, Montebello**

The Laguna Nueva Elementary School was built in 1992 on a partially excavated Class III landfill used for rubbish. The school site was initially investigated by DTSC in 2000 due to a planned school expansion on the adjoining properties. Investigations conducted in 2001 indicated that elevated levels of metals, petroleum hydrocarbons, methane and volatile organic compounds in the northwest area of the site that was used as the landfill. Based on investigation results, the school district has been monitoring methane on a monthly basis and other gases on a quarterly basis since July 2001. Additional investigations were conducted to characterize the extent of contamination. A health risk assessment indicated that based on current conditions, the site does not pose a threat to school students and staff. Currently, remediation options are being evaluated in a Feasibility Study for the site.

#### **e.) Scripps Ranch Elementary School, Poway**

The Scripps Ranch Elementary School is proposed to be constructed on a 36-acre site on hilly terrain consisting of brush and vegetation, with a portion occupied by student housing and tennis courts associated with a private university. A portion of the site is located within the boundaries of a former target ranch for Camp Elliot. Ordnance and explosives may be present on site. The school district is in the process of preparing a Preliminary Endangerment Assessment Work Plan to conduct an investigation for the site. The investigation will be coupled with procedures to address any ordnance and explosives encountered at the site during investigation activities.

**f.) Dover Elementary School, San Pablo**

Dover Elementary School, consisting of 6.4 acres, has been in operation since December 1935. In response to a complaint alleged that a student was sent home from the school to wash off material dripped onto the student from a leaking fluorescent light ballast, DTSC initiated a sampling investigation of the school in September 2002. Elevated levels of polychlorinated biphenyls (PCBs) were detected in the collected samples. At DTSC's request, the school replaced all of the PCB containing ballasts by October 18, 2002. Subsequently, the school conducted an emergency removal to remove PCB-impacted materials from the school under DTSC's oversight. Additional removal of floor tiles in two classrooms was conducted in April 2003, followed the results of initial confirmation samplings. Based on the final confirmation sampling results, DTSC determined that no further action was required of the school site in August 2003.

**g.) Los Angeles Academy (formerly Jefferson New Middle School), Los Angeles**

This is an operating middle school, with significant contamination deep underneath (deep soil and groundwater). The school has been in operation since 1998. DTSC became aware of the school construction in 1995, during investigation of a contaminated property, across the street from the school site. The school site had a number of past industrial uses and had known contamination from leaking underground storage tanks, which contained solvents. Due to lack of a thorough investigation, record keeping, and a poorly planned remediation system by the school district, DTSC was requested by the community and parents to investigate the school property. DTSC investigations ensured that the school property is safe for the occupants, thus enabling the opening and continued operation of the school. A Consent Order, with all the available responsible parties including the school district, was signed in January 2001. A redesigned, properly permitted soil remediation system was commissioned in August 2002. The remedial investigation for the shallow soil, up to 40 feet below ground surface, was completed in February 2003. The remedial investigation for the deep soil, 40 to 145 feet below ground surface, is expected to be complete by the end of 2003. The remedial investigation for the groundwater is expected to start in 2004. The groundwater contamination in this area is very significant and wide-spread. In view of the multiple releases, potentially responsible parties, and commingled plumes, the groundwater remediation is anticipated to be a major challenge.

**h.) Third Street Elementary School, Los Angeles**

This is an operating elementary school, with continual seepage of crude oil in its play ground area. The oil collects in a sump, fenced and locked to prevent access to children. The school district has arranged for monitoring, and for periodical pumping out of the oil collected. The sump, originally constructed in 1970, overflowed some times, the last occurrence being in April 2002, reflecting the unpredictable collection rates and conditions. The methane measurements at the vapor space of the sump showed concentrations up to 27% of the lower explosive limit, triggering DTSC requests to address the problem with a permanent solution. It is generally believed that the sump was built on an improperly abandoned oil well. The school district is working with Chevron Texaco, the past owner of oil exploration wells in this area and the

Division of Oil, Gas and Geothermal Resources, to investigate the seepage and provide for abandonment or relocation of the sump. The school district is expected to monitor conditions at this area and implement a permanent solution by the summer of 2004.

**i.) Woodcrest Elementary and Junior High Schools, Chino**

The Woodcrest Junior High School was constructed in 1995 over property which was used as a dairy farm from 1962 to 1992. During the PEA investigation conducted for new construction of an elementary school and new junior high school buildings, methane was discovered in soil gas at concentrations up to 186,000 parts per million. Methane is combustible and potentially explosive at concentrations above 50,000 ppm. Monitoring of enclosed spaces under the existing school structures, which were constructed on raised foundations, has been conducted since August 2000. A RAW was prepared to outline the design of a methane mitigation system under the new school buildings and retrofit of the existing buildings. As part of the school construction activities, which began in January, 2003, a membrane barrier and passive venting system is being installed under all new buildings. This system consists of perforated pipes that lead to vent risers above the roofline and an impermeable subslab barrier underneath the new building foundations. The existing structures have been mitigated with a passive venting system by horizontal trenching underneath and installation of perforated piping. Construction of the elementary school and retrofit of existing buildings is almost complete, and construction of the junior high school will be complete by the end of summer, 2004. DTSC is currently drafting an Operation and Maintenance Agreement with the school district for ongoing monitoring and maintenance of the methane systems.

**j.) Stoneman Elementary School and O'Hara Middle School, Pittsburg**

During the construction of the O'Hara Park Middle School in 1988 and the Stoneman Elementary School in 1990, Sierra-Crete® was used as a base material beneath asphalt-paved portions of both schools. Sierra-Crete® is a structural road-base material that was manufactured at the former DuPont facility located in Oakley, California, between the years 1977-1988. In early 2002 when it was discovered that Sierra-Crete® contained traces of dioxins, hexavalent chromium, and other metals, DuPont contacted DTSC, Contra Costa County Health Department, and the cities of Antioch, Oakley, and Pittsburg where Sierra-Crete® was used. A Human Health Risk Assessment was conducted and further investigation was determined to be needed. PEAs were conducted at both schools. Two exposure scenarios were used to evaluate potential health risks to students, teachers, and staff at the schools. One scenario assumed direct daily exposure for 30 years to Sierra-Crete® at the ground surface. The other scenario considered that the Sierra-Crete® was buried and therefore potential for direct contact was minimal. Based on the results of the hypothetical, worst-case scenario, a removal action was deemed necessary to mitigate the potential for increased risk for health impacts. Removal actions were carried out at these schools in July and August, 2003. Asphalt and underlying Sierra-Crete® were excavated and disposed off-site as non-hazardous waste. The excavated areas were then backfilled and compacted with a crushed rock sub-base material and repaved.



### **k.) Yulupa Elementary School, Santa Rosa**

Approximately five years ago, a Texas manufacturer offered the Bennett Valley Union School District metal-free tire chips to be used in a playground demonstration project. The District accepted the offer to show the value of recycled material. On August 3, 2003, a fire was started in the tire chip playground material. Approximately nine out of the sixteen tons of tire chip playground material were involved in the fire. Tire chip depth was one and a half to two feet in depth over a former sand playground. The playground was no longer useable and there was a strong chemical odor present. Based on guidance from the Sonoma County Local Enforcement Agency and Cal/EPA Integrated Waste Management Board, the District requested assistance and funding to immediately remove the debris before the school schedule began on September 2, 2003. Concerns at the site were volatile organic compounds, metals, polynuclear aromatic hydrocarbons (PAHs), and dioxins and furans. DTSC implemented confirmation sampling after the tire chip material was excavated and is currently preparing a risk assessment report and has determined there is no risk to students and faculty. The District will redevelop the play area after cleanup.

### **l.) Avalon K-12 Schools, Catalina Island**

Based on the results of the September 2001 soil sampling investigation and a human-health risk assessment, the school campus, with the exception of the contaminated areas was re-opened to students and faculty for continuation of classes on October 3, 2001. Further sampling was conducted during a DTSC-approved Remedial Investigation (RI) in January 2002. The identified chemicals of concern (lead, dioxins and furans) within near-surface soils on the site that may pose a potential health risk. This investigation resulted in the compilation of a DTSC-approved Feasibility Study which identified potential remedial alternatives based on the nature and extent of soil impacts. The Remedial Action Plan identified "Selective Excavation and Offsite Disposal" as the favored remedial alternative for the mitigation the chemicals of concern. The total volume of soil scheduled for excavation and removal from the site is approximately 3039 cubic yards (4559 tons). Implementation of the remedial action is scheduled to begin June 2005.

### **m.) Mare Island Elementary School, Vallejo**

The Mare Island Elementary School is located on the former Mare Island Naval Shipyard. Currently, children are bussed to the school from Vallejo and the school district is in negotiations with the Navy to acquire the school site. Prior to the property transfer, the school district needs a 'No Further Action' determination from DTSC. A scoping meeting for the Preliminary Environmental Assessment (PEA) Work Plan was held in April 2003, where the following site concerns were identified: past fuel oil storage and distribution has contaminated the soil and groundwater (most of the TPH contaminated soil was removed and groundwater is not used from the school); dredge material that was placed at or near the site to enlarge the original island may contain high levels of arsenic (up to 48 mg/kg); fill material used in the past to backfill utility trenches on site contained high levels of heavy metals ("greensand"); potential lead contamination from buildings; potential use of pesticides near buildings; potential PCB contamination from three transformers. These concerns are currently investigated in the PEA

which is expected to be completed in November 2003. A diesel plume was discovered west/southwest of the school, and most of the contamination was removed by September 2003.

### ***5.) Supplemental Guidance***

Many of the documents cited below can be found on the DTSC web site: [www.dtsc.ca.gov](http://www.dtsc.ca.gov).

#### **a.) Guidance/ Advisories**

- Revised Interim Guidance for Sampling Agricultural Soils, August 26, 2002
- Interim Guidance for Evaluating Lead-Based Paint and Asbestos-Containing Materials at Proposed School Sites, July 23, 2001
- Guidance for Integration of School Sites Requirements and Site Mitigation Program Activities at Military Facilities, October 23, 2001
- Phase I Environmental Site Assessment Advisory: School Property Evaluations, September 5, 2001
- Project Manager Advisory: PCBs and Transformers, September 2001
- Information Advisory: Clean Imported Fill Material. October 2001
- Project Manager Advisory: Hydrogen Sulfide, October 2001
- Project Manager Advisory: Methane Gas, October 2001
- PCB Advisory for Schools—How Voluntary Lighting Retrofits Can Address Hidden Dangers and Liabilities, April 29, 2003.
- Advisory—Active Soil Gas Survey, January 29, 2002. Department of Toxic Substances Control and the Los Angeles Regional Water Quality Control Board

#### **b.) Fact Sheets**

- Fact Sheet #1: New Environmental Requirements for Proposed School Sites, Assembly Bill 387 and Senate Bill 162, June 2000
- Fact Sheet #2: Update on Environmental Requirements for Proposed School Sites/Construction Projects, AB 2644 Summary, February 2001
- Fact Sheet #3: Update on School Site Environmental Review Process, AB 972 Summary, November 2001
- Fact Sheet #4: Further Action/Response Actions at Schools
- Fact Sheet #4a: Further Action/Response Actions at Schools
- Fact Sheet #5a: Proposed Regulations on Preparation of Phase I Site Assessments
- Fact Sheet #5b: Phase I Addendum Template
- Fact Sheet #6: Federal Brownfields Grants Available to School Districts
- Fact Sheet # 7: Environmental Assessments for Charter School Sites
- Fact Sheet # 8: PCBs in Schools—Voluntary Lighting Retrofits Can Address Hidden Dangers and Liabilities

### c.) Guidance in Draft

- Draft Interim Report on LAUSD Arsenic Background
- Draft Guidance on Evaluation and Mitigation of Radon on Proposed School Sites
- Draft Guidance on Naturally Occurring Asbestos at Proposed School Sites
- Draft Guidance on Petroleum Sites and Total Petroleum Hydrocarbons (TPH)  
Project Manager Advisory: Septic Systems
- Draft Advisory—Methane Assessment and Common Remedies at School Sites

### c. Emerging Issues

Because children spend a significant amount of their waking hours in the school environment where they can have contact with potentially contaminated soils, schools can be seen as extension of their living environment. This is especially true in areas where school facilities include extended day-care units, so potential exposures to contaminants can occur even at the pre-kindergarten level. Ensuring that these school environments are not contaminated with hazardous materials, creates a safe living environment protective of childhood development. There are concerns that significant environmental contamination, with accompanying health risks, may be present at some of California's existing schools. However, school districts lack legal and financial incentives and provisions to fund investigations and cleanups because current laws do not require that environmental assessments be performed at existing schools.

There are approximately 8,740 schools in California. Many of these existing schools were built 30 to 40 years ago, and the California Department of Education has determined that 73% of the state's classrooms are over 25 years old. Although most contaminated schools tend to be situated in urban areas, rural and agricultural areas are not exempt from environmental contamination. The sources of their contamination have varied. Some schools were built on poorly characterized and/or unremediated sites. Numerous school sites had undocumented fill material brought in during prior ownership or school construction. In some cases, even if the original schools were built on clean property, commercial and industrial facilities were built adjacent to schools, and schools were impacted by offsite migration of contaminants. Some existing schools were located next to landfills or on properties requiring ongoing environmental cleanup or monitoring. Recently, several schools built on burn ash waste disposal sites were brought to the attention of DTSC. Many older schools have lead contaminated soil from previous use of lead-based paint, and organochlorine pesticide residues, such as chlordane, in the soil around buildings from termite control procedures. DTSC has overseen investigations at existing schools which include dioxin and lead contamination from onsite incinerators, arsenic contamination from use of arsenical herbicides, organochlorine pesticides on the play fields from adjacent pesticide business, hexavalent chromium from adjacent chrome plating facilities, methane and gas impacts from adjacent landfills, oily wastes from landfills and collection ponds, heavy metal contamination from adjacent industrial businesses, and volatile organic compounds (VOCs) from former underground storage tanks.

DTSC has conducted remediation at a number of existing schools where school districts have elected to enter into Voluntary Cleanup Agreements. However, there are no current laws that require a systematic environmental review of existing schools, except in those situations where the school is adding a significant new building addition that would require state funding. Under the current statutes, DTSC oversight is required for such new construction, but not for the existing school adjacent to the new construction. School districts are currently not required to involve DTSC when hazardous materials are discovered during activities such as modernization, installation of portable classrooms, or routine maintenance. Furthermore, school districts are not required to involve DTSC when concerns arise about hazardous materials migrating from adjacent properties. Although DTSC will continue to provide assistance to existing schools when requested, DTSC has no authority to provide environmental oversight in situations where hazardous materials may be present at existing school sites.

#### **d. Planned Activities for the Next Two Years**

Based upon close interaction between DTSC and school districts across the state, DTSC has projected that there will continue to be a steady flow of proposed school sites requiring review and approval. Guidance to improve the screening and review of these properties is currently being drafted. These will be completed and issued in the next calendar year. Additional guidance will be initiated as issues and areas of concern become apparent. This may accelerate as school districts continue to acquire inner-city properties for development.

DTSC will continue to update its comprehensive database that is available on the DTSC website. The information in database will enable DTSC to identify trends, regional problems, similar clean-up responses, and costs to remediate school sites. This information will be used for developing new approaches to investigation, risk assessment, and remediation.

DTSC will continue to provide the Office of Environmental Health Hazard Assessment (OEHHA) with reports containing information and data on the Schools Program for use in selection of chemicals of concern to children and development of exposure scenarios specific to children at school.

Existing schools are required to have DTSC oversight for environmental assessment if they are constructing a significant addition that requires state funding. The school districts are currently not required to involve DTSC when hazardous materials are discovered during other activities such as modernization, installation of portable classrooms, or routine maintenance. Furthermore, the school districts are not required to involve DTSC when concerns arise about hazardous materials from adjacent properties. DTSC will continue to provide assistance to existing schools when requested; however, DTSC has no authority to provide environmental oversight in situations where hazardous material may be present at existing school sites.

#### **e. Program Benefits to Children's Environmental Health**

Because children spend a significant amount of their waking hours in the school environment where they can have contact with potentially contaminated soils, schools can be seen as extension of their living environment. This is especially true in areas where school facilities

include extended day-care units, so potential exposures to contaminants can occur even at the pre-kindergarten level. Ensuring that these school environments are not contaminated with hazardous materials, creates a safe living environment protective of childhood development. DTSC has evaluated new school properties and a handful of existing schools in order to determine that they are safe from both short term and long term health risks from contaminated soils. The DTSC environmental overview has helped motivate school districts to become more selective in evaluating potential school properties, and the program has enabled community members and parents a more active participation role in selection of school properties.

#### **f. Recommendations**

As discussed in the section on Emerging Issues: Existing Schools, there is no current systematic assessment or procedure for existing schools that encounter or suspect hazardous materials on their properties that require the involvement of environmental oversight agencies, such as DTSC. As described in Emerging Issues, there are a number of examples of existing schools with significant environmental contamination that either have required or will require remediation. The potential number of these schools throughout California may be in the hundreds. One of the critical issues identified by school districts is the lack of specific funding to address these environmental issues. Further study of existing schools may be appropriate in order to assess this potential problem.

### **3. *Building Materials Emissions Study***

#### **a. Purpose and Requirements**

The CIWMB promotes the use of recycled content products in schools and state buildings, and wants to assure consumers that these products are safe. Therefore, in March 2001, CIWMB agreed to fund a Building Material Emissions Study to examine the relationship between recycled-content products and their affect on indoor air quality. The focus was on building materials used for permanent and portable classroom construction in California, materials specific to state construction, and tire-derived resilient flooring products. The study also compared and evaluated whether the products would meet low-emitting indoor air quality criteria established in the *Special Environmental Requirements* construction specification (*Section 01350*) for use in classroom and state construction, see [www.ciwmb.ca.gov/GreenBuilding/Specs/Section01350/](http://www.ciwmb.ca.gov/GreenBuilding/Specs/Section01350/).

One purpose of the Building Materials Emissions Study was to evaluate concerns that recycled content products may compromise indoor air quality. Therefore, it was an objective of the study to examine the relationship between recycled-content products and their affect on indoor air quality. Another purpose of this study was to compare chemical emissions of alternative products to standard or commonly used building materials. Alternative products did not only include recycled content, but products that were rapidly renewable or marketed as containing no- or low- volatile organic compounds. Lastly, the study evaluated whether standard and alternative products would meet low-emitting indoor air quality criteria, established in Section 01350, for use in classrooms and state construction.

Procurement of recycled-content products is one sustainable feature promoted by the CIWMB for the design and construction of high-performance schools and state construction projects. Not only do recycled-content products create markets for materials that have been collected through the recycling process, but they are also an essential component of California local (AB 939) and State (AB75 Strom-Martin) governments' efforts to meet and exceed the 50 percent waste diversion mandate.

**b. Accomplishments as of January 1, 2002 – December 31, 2003**

The Building Material Emissions Study was completed in 2003 and approved by the CIWMB at their June 17-18, 2003 Board Meeting. This study dispels the myths about recycled content products and proves that there are low emitting recycled content products that can contribute to healthy indoor environments. Recycled content products should no longer be subject to greater scrutiny than their standard counterparts. Both alternative and standard products emit chemicals of concern. To the extent that manufacturers continue to test products to assure that they meet Section 01350, more building materials will be acknowledged as environmentally preferable products and contribute to the construction of high performance schools. A copy of the Building Material Emissions Study is available at CIWMB's website: [www.ciwmb.ca.gov/GreenBuilding/Specs/Section01350/METStudy.htm](http://www.ciwmb.ca.gov/GreenBuilding/Specs/Section01350/METStudy.htm). Section 01350 testing and emission criteria can be downloaded at: [www.ciwmb.ca.gov/GreenBuilding/Specs/Section01350](http://www.ciwmb.ca.gov/GreenBuilding/Specs/Section01350)

**c. Planned Activities for the Next Two Years**

The Collaborative for High Performance Schools (CHPS) is a non-profit organization dedicated to improving learning environments for children. The CHPS develops standards for the design and construction of high performance schools. One of the criteria within the CHPS Best Practices Manual was established to provide credit to schools districts that specify low-emitting building materials.

Several of the largest school districts in California including the Los Angeles Unified School District (LAUSD), Santa Ana Unified School District (SAUSD), and San Francisco Unified School District (SFUSD) have adopted the CHPS Criteria and are developing policies to incorporate low-emitting materials into their new construction and modernization projects. These districts educate a majority of students. The CIWMB sponsored Heroes High Performance Demonstration School and the California Energy Commission sponsored Truckee High Performance Demonstration School. Both schools established goals to meet the CHPS Criteria and incorporate low-emitting materials in the construction.

In the next few years, the Los Angeles Unified School District (LAUSD), the largest school district in the State of California and the second largest in the nation, plans to build nearly 100 new schools. This represents about 35% of the planned school construction in California. Recently, LAUSD adopted a low-emitting building materials initiative. They requested information from a number of manufacturers on how selected products, which could be specified for school construction, perform in relation to Section 01350. As manufacturers have their

products tested at independent laboratories and provide the appropriate documentation to LAUSD, the information will be forwarded to CHPS. School products that are compliant with the low-emitting indoor air quality criteria in Section 01350 will be posted on the CHPS website. Each of these products will also be considered for inclusion in the Division of the State Architect's Environmentally Preferable Products database. As a result, at least one-third of future schools built in California should incorporate products that contribute to good indoor air quality.

#### **d. Benefits to Children's Environmental Health**

The Building Material Emissions Study used Section 01350 indoor air quality testing protocols, which includes some of the most stringent criteria developed to date to protect the health of building occupants. Section 01350 compliance is based on the Chronic Reference Exposure Levels (CREL) published by OEHHA. The CREL established by OEHHA is an airborne level that would pose no significant health risk to individuals exposed to that level for an indefinite period of time. It is based entirely on health considerations and is developed from the best available data in scientific literature. Most acceptable concentration limits within Section 01350 were set at 50% of the CREL, based on the fact that each CREL is the recommended airborne level from all sources and more than one product may emit that chemical indoors. One exception was formaldehyde. Since the current CREL for formaldehyde is close to typical ambient levels, the threshold for that chemical was based on ½ of OEHHA's recommended 8-hour indoor Reference Exposure Level of 27 ppb for formaldehyde.

By using Section 01350 as the screening criteria for building materials for this study, researchers were able to identify chemicals of concern that are found in standard and alternative building materials used in school construction. While most products met Section 01350, the chemicals that most frequently exceeded the emissions criteria included formaldehyde, naphthalene, and acetaldehyde. Based on the results of this study, manufacturers are encouraged to test their products according to Section 01350 through independent laboratories.

As school districts continue to demand low-emitting products that meet Section 01350, it is anticipated that more manufacturers will respond to this demand and information on low-emitting products will be readily available. Ultimately, this study will contribute to the creation and maintenance of healthy learning environments.

#### **e. Recommendations**

Further research needs to be done comparing indoor air quality in classrooms constructed using Section 01350 to classrooms constructed without Section 01350 to determine what extent this specification impacts indoor air quality. Without real world data, it is only an educated assumption that Section 01350 improves indoor air quality in the classroom. With real world data to compare the expected improvements in classroom air quality, epidemiological studies could be conducted to determine the effect on children's health.

#### 4. *Integrated Pest Management (IPM) at Schools*

##### a. Purpose and Requirements of the Legislation

##### The California School IPM Program and the Healthy Schools Act

Department of Pesticide Regulation



In 1993, the Department of Pesticide Regulation (DPR) began a pilot program to work with interested school districts to provide them information about integrated pest management (IPM) practices and assist them in developing IPM programs. DPR also conducted a survey of school districts in 1996 to gain information about their IPM policies and practices. Governor Davis later signed the Healthy Schools Act (Chapter 718, Statutes of 2000, AB 2260) into law on September 25, 2000. This law, authored by Assembly Member Kevin Shelley, put DPR's existing voluntary California School IPM Program into code and added new right-to-know requirements regarding pesticides, such as notification, posting, and record keeping for schools, and enhanced

pesticide use reporting for licensed pest control businesses. By January 1, 2002, all provisions were in effect. The Healthy Schools Act established least-hazardous IPM as the state's preferred method of pest control for schools. The Act defined this approach as "a pest management strategy that focuses on long-term prevention or suppression of pest problems through a combination of techniques such as monitoring for pest presence and establishing treatment threshold levels, using nonchemical practices to make the habitat less conducive to pest development, improving sanitation, and employing mechanical and physical controls. Pesticides that pose the least possible hazard and are effective in a manner that minimizes risks to people, property, and the environment, are used only after careful monitoring indicates they are needed according to pre-established guidelines and treatment thresholds" (Food and Agricultural Code section 13181). Through its school IPM program, DPR is committed to facilitating voluntary establishment of IPM policies and programs in schools throughout California, while assisting school districts with implementation of the new Education Code requirements.

How is DPR helping school districts?

- Establishing an IPM in Schools Web site, [www.schoolipm.info](http://www.schoolipm.info), with samples of letters to parents about expected pesticide use and the registry, a template for the warning sign, and information about IPM practices as well as public health and environmental impacts of pesticide.
- Identifying and training individuals designated by school districts to carry out school IPM. DPR conducts voluntary IPM training workshops so that those who carry out the IPM programs understand principles of IPM and can train other staff.
- Assisting school districts to establish IPM policies and programs. Some school districts already are working with DPR to establish IPM programs. In addition, the school IPM Web



site has examples of policies and programs some school districts have developed that other districts may use or modify. Each year, DPR staff publishes articles in trade journals to help school districts establish or improve their IPM program. In addition, DPR publicizes its California School IPM Program at meetings attended by maintenance and operations directors and their staff, school administrators, educators, and parents.

- Developing a model IPM program guidebook. The *California School IPM Guidebook for a Model Integrated Pest Management Program* is posted on the school IPM Web site. It lays out the essential elements of a least-hazardous IPM program and the steps to adopting an IPM program. Specific strategies for pest management indoors and outdoors are covered in the second part of the guidebook.
- Evaluating adoption of IPM programs by schools. Baseline and follow-up surveys help DPR measure adoption of IPM programs by schools, evaluate what kind of outreach school districts need, and how effective this outreach has been.

In addition to the activities outlined above, the law adds certain requirements to the Education Code (EC sections 17608–17613):

- Each school district is to provide written notification with specified information on pesticides to all school staff and parents or guardians of students annually. In this written notification the school district is to identify all pesticide products (with some exceptions) it expects to be applied by district staff or an outside contractor in the upcoming year, and the address of DPR's School IPM Program Web site.
- Each school is to provide the opportunity for interested staff and parents to register with the school district if they want to be notified of individual pesticide applications at the school before they occur.
- The school district is to post warning signs at each area of the school where pesticides will be applied. These signs are posted 24 hours in advance and 72 hours after applications and should be sufficient, in the district's opinion, to restrict uninformed access to treated areas.
- Each school is to maintain records of all pesticide use at the school for four years and make the records available to the public upon request.
- Each school district is to designate an individual (also known as an IPM coordinator) to carry out these requirements.

The law (Food and Agricultural Code section 13186) also requires that:

- Licensed pest control businesses report pesticide applications by school to the Director of DPR annually.

The law (Food and Agricultural Code sections 13180–13185) adds certain requirements of DPR, with which DPR has complied.

- The DPR prepared a school pesticide use reporting form to be used by licensed pest control businesses when they apply any pesticides at a school. Licensed pest control businesses must submit the form to DPR at least annually.
- The DPR established and maintains a School IPM Web site that contains information on pesticide products, a comprehensive directory of resources describing and promoting least-hazardous pest management practices at schools, the model program guidebook, and ways to reduce the use of pesticides at school facilities. The Health and Environmental LookUP Resource pages (HELPR) provide information about public health and environmental impacts of pesticides in a user-friendly format.
- The DPR promotes and facilitates the voluntary adoption of IPM programs for school districts that voluntarily choose to do so, while it helps all school districts to comply with the new provisions of the Education Code.

#### **b. Accomplishments for January 1, 2002 – December 31, 2003**

- The 2001 Biennial Report of the Children's Environmental Health Center contains descriptions of previous accomplishments.
- The DPR developed and conducted a pilot school IPM training workshop attended by 31 school district staff representing 29 districts. We invited observers to attend and evaluate the program. We also solicited comments from DPR's School IPM Advisory Group. Based on their comments, we revised the program for the regional workshops.
- The DPR conducted four regional school IPM training workshops statewide (Los Angeles, San Diego, Yolo, and Shasta counties); 100 staff from 79 school districts participated.
- The DPR developed and distributed pest-specific school IPM fact sheets on ants and on cockroaches, and began work on yellow jackets, gophers, and weeds.
- We worked with DPR's California School IPM Advisory Group to review and revise our publication, entitled *California School IPM Guidebook for a Model Integrated Pest Management Program*. We distributed this revised edition (2003) in our school IPM training workshops and posted it to our Web site.

- Located on the school IPM Web site, the Health and Environmental LookUP Resource pages (HELPR) provide information about public health and environmental impacts of pesticides in a user-friendly format. We have integrated authoritative pest management recommendations from University of California (UC) IPM with DPR's product-label database resources to put important information in one place. Starting with a specific pest, users can first read the appropriate management recommendations from UC IPM's Pest Notes series. A click of the mouse then takes you to a page summarizing toxicological and exposure data for all of the management tactics mentioned in the Pest Note. This page includes:
  - Information on toxicity (fact sheets from National Pesticide Information Center, Extension Toxicology Network, and others).
  - Information on exposure (availability of lower-exposure formulations such as baits, traps, or gels/pastes).
  - Consequences of not treating (health, economic, and environmental implications).
  - Lists of products available, with U.S. Environmental Protection Agency signal words and restricted status.
  - Status of pesticide active ingredients on various official government lists.
  - HELPR pages are available for ants, cockroaches, flies, head lice, spiders, termites, gophers, mice and rats.
- The DPR conducted its first school district survey in 2001 to gather information on various pest management practices and policies and to identify resources that school districts might need for implementing IPM. Based on the results, DPR focused its attention on resources of most interest to school staff: preventing pest problems, least-toxic pest management practices, pest management practices at other schools, and lists of products/tools considered to be least-toxic pest management alternatives.
- The DPR conducted its second survey and published the results in a report entitled *2002 Integrated Pest Management Survey of California School Districts Summary Report of Findings*; the report was also posted to our Web site. Based on these results, California's public schools appear to be making some progress toward an IPM approach in their ant management and record keeping practices, even though the Healthy Schools Act record keeping requirements remain a challenge for many districts. The survey's picture of weed management practices is less clear; improving weed IPM and avoiding calendar treatment schedules may require additional attention. Generally speaking, larger, urban schools seem to be performing better than rural schools, underlining the need for training in rural areas. These surveys will be invaluable in monitoring progress of school IPM programs in future years.
- The DPR finalized its Frequently Asked Questions (FAQ) document. Staff published four articles to assist school districts to implement IPM and to promote the adoption of IPM. DPR contacted all school districts to let them know we established a list server and how to subscribe. DPR staff conducted 30 presentations. Staff responded to numerous questions and requests for information from school districts and other stakeholders.

### List of Publications

Babb, T., L. Hawkins and D. Tootelian. 2002. Making the Grade in School Pest Management. CASBO Journal of School Business Management 67(5): 16-21.

Babb, T. and D. Tootelian. 2003. Putting IPM into Practice. CASBO Journal of School Business Management, July/August: 29-35.

Brattesani, M. and D. Tootelian. 2003. Pests and Pest Management: Making the Grade with Integrated Pest Management. Small School Districts' Association Newsletter 22(8): 2,4.

Geiger, C.A. and D.H. Tootelian. 2002. 2002 Integrated Pest Management Survey of California School Districts. Pest Management and Licensing Branch, DPR, Sacramento, CA. [http://www.schoolipm.info/overview/24\\_Survey2002.pdf](http://www.schoolipm.info/overview/24_Survey2002.pdf)

Messenger, B., T. Drlik, and M. Brattesani. 2003. California School IPM Guidebook for a Model Integrated Pest Management Program. Second Edition. PM Report 02-04. Pest Management and Licensing Branch, Department of Pesticide Regulation, Sacramento, CA.

Simmons, S. 2002. Pest Prevention: Maintenance Practices and Facility Design. PM Report 92-03. DPR, Sacramento, CA. [http://www.schoolipm.info/managing\\_pests/71\\_pest\\_prevention.cfm?crumbs\\_list=1,5,34](http://www.schoolipm.info/managing_pests/71_pest_prevention.cfm?crumbs_list=1,5,34)

Tootelian, D. H. 2001. 2001 IPM Baseline Survey of School Districts. Performed under contract for Pest Management and Licensing Branch, DPR, Sacramento, CA. [http://www.schoolipm.info/overview/24\\_Survey2001.pdf](http://www.schoolipm.info/overview/24_Survey2001.pdf)

- The DPR collects pesticide use information from licensed pest control businesses. Staff are developing a temporary database in which information can be stored. However, entering and analyzing the data are on hold due to insufficient resources.
- The DPR, in cooperation with the UC Statewide IPM Program, began developing an interactive school IPM training CD-ROM. This is modeled after a successful UC Master Gardener pilot project and is intended to supplement the training workshops by providing IPM coordinators with an additional tool to use for their localized inter-district training efforts.

**c. Planned Activities Over the Next Two Years (January 1, 2004 – December 31, 2005)**

- The DPR staff plans to maintain and update the school IPM Web site. They will review FAQs and the Program Overview, and revise if necessary.
- The DPR will continue to communicate with the School IPM Advisory Group and solicit input and suggestions for improving the California School IPM program.
- The DPR plans to conduct four regional school IPM training workshops statewide each year. Each workshop can accommodate up to 40 participants. Over the next two years, up to 320 school districts will participate in these training workshops. In 2004, workshops will be held in Santa Clara, Stanislaus, Tulare, and Ventura counties.
- The DPR plans to evaluate the implementation of IPM by those districts that attended school IPM training workshops with a third survey. This survey will be completed in 2005.
- The DPR will complete and distribute three interactive school IPM training CD-ROMs to districts statewide and evaluate their use and effectiveness.
- The DPR plans to distribute school IPM curricula on key pests to school IPM coordinators who participate in training workshops. We also plan to post the curricula to the school IPM Web site.
- The DPR will develop more pest-specific IPM fact sheets (yellow jackets, gophers, weeds) to distribute and post to the school IPM Web site
- The DPR will evaluate how to reach small remote school districts that are interested in using IPM at their schools.
- Every two years, DPR conducts a follow-up survey with school districts statewide to evaluate their pest management practices and how effective DPR's outreach efforts are. DPR will conduct its third (2004) survey and publish its results in a report that will be provided to all school districts. DPR plans to use the information to revise its outreach and training efforts, as needed.
- The DPR plans a variety of outreach efforts. DPR staff will continue to make presentations to provide information about the Healthy Schools Act and components of DPR's California School IPM Program. DPR also plans to publish articles about its California School IPM Program and the Healthy Schools Act in key school publications. These efforts will target school boards and school district superintendents, business managers, and risk managers to publicize DPR's training program and to promote and facilitate the voluntary adoption of an IPM program.

- The DPR will continue to collect pesticide use information reported by licensed pest control businesses.

#### **d. Program Benefits to Children's Health**

- The Healthy Schools Act increases information to parents and guardians of students and to staff about pesticide use at their schools.
- In addition, the Healthy Schools Act establishes effective least-hazardous IPM as the state's preferred method of school pest control. Using IPM reduces exposure of children to pesticides.
- The DPR has a legal mandate to encourage the use of more environmentally sound pest management systems, including IPM. DPR emphasizes a reduced-risk approach to pest management by promoting and facilitating adoption of IPM programs by school districts. The DPR encourages the development and adoption of pest management practices that reduce the overall risk to human health and the environment.
- The DPR school IPM training workshops allow school district staff to learn more about IPM and implement an IPM program at their schools. Staff knowledgeable about IPM will be able to more successfully implement an effective program.

#### **e. Recommendations**

We recommend that funding continue to establish widespread adoption of school IPM by school districts. Such activities will greatly reduce potential risk of exposure to pesticides in schools.

#### ***IPM and Environmental Health Education***

DPR also works with other boards and departments of the California Environmental Protection Agency and with the California Department of Education to tie IPM into related areas such as school gardens and environmental education.

##### **1. Urban Initiative**

In California, pesticides used in or around the home may include illegal (unregistered) pesticides, or legal pesticides that are misused or improperly disposed. Through its Urban Initiative Program, the U.S. Environmental Protection Agency awarded DPR \$150,000 for a two-year period to address these issues.

The use of insecticidal chalk—an illegal product imported from China—has become popular in many areas of California. The chalk, sold at flea markets and small neighborhood retail stores, is commonly used to control ants and cockroaches. Because it looks identical to blackboard chalk, children have become ill from handling or eating it. Between 1992 and 1995, Poison Control Centers nationwide received 668 reports of incidents involving insecticidal chalk. Other

pesticides may be repackaged by residential users and mistaken for non-pesticidal products. Pesticides may be illegally or inappropriately used in classrooms to treat pests. Additionally, in residential areas, inexperienced pesticide users may over-apply pesticide products, resulting in contamination of creeks, rivers, lakes, and oceans. Thus, illegal and improper pesticide use threatens both human health and the environment.

In April 2001, DPR awarded most of the U.S. EPA funding—\$120,000—to the Aquatic Outreach Institute (AOI) of Richmond for an environmental education program, “Watching Our Watersheds.” The group developed train-the-trainer workshops for sixth- through twelfth-grade teachers in an area that includes Alameda, Contra Costa, and San Francisco counties. Teachers received training in safe use and disposal of pesticides, as well as IPM for homes, gardens, and schools.

Over 18 months, 120 teachers were trained and curriculum developed that can be used statewide in urban and rural school districts. Teachers who completed the training were provided with an extensive activity-based binder that includes projects easily performed with students, and instructions explaining how to conduct pollution-prevention projects on or near the school grounds. The teachers also had the opportunity to apply for stipends from AOI (with oversight from DPR) to develop specific classroom projects educating students about the hazards associated with illegal pesticides and improper pesticide use and disposal.

## **2. Kids in Gardens**

The DPR also funded AOI through its competitive Pest Management Grant Program to conduct school garden workshops. The workshops drew kindergarten- through twelfth-grade teachers who learned about soil, composting, plant propagation, and IPM. As with the Watching Our Watersheds program (see above), workshop alumni could apply for stipends to develop special classroom projects. During its second year, AOI expanded on the program to include San Francisco Park and Recreation staff, who created after-school gardening programs that incorporated IPM. DPR awarded AOI \$110,000 over a three-year period for nine two-day workshops, in which 350 educators were trained.

## **3. California Environmental Education Interagency Network (CEEIN)**

The DPR participates in CEEIN, a consortium of environmental educators representing California state departments, boards, and commissions of the Department of Education, Cal/EPA, and the Resources Agency with oversight to protect California’s environment.

## ***5. Playground Equipment and Surfacing Replacement***

### **a. Park Playground Accessibility and Recycling Grant Program (Villaraigosa-Keeley Act) - 1st Cycle & 2nd Cycle**

#### ***1.) Purpose and Requirements of the Legislation***

The Park Playground Accessibility and Recycling Grant Program was established by the Safe Neighborhoods, Clean Water, Clean Air, and Coastal Protection (Villaraigosa-Keeley Act) Bond Act. This Act authorized CIWMB to administer a grant program to upgrade public park playgrounds using recycled-content materials and to assist park districts in meeting state and federal accessibility standards relating to public playgrounds (Public Resource Code (PRC) § 5096.310(x)). The upgrades were required to comply with state and federal accessibility requirements and to satisfy the California Department of Health Services' playground safety regulations. The FY 2000/2001 Budget Act and the FY 2001/2002 Budget Act each appropriated \$2.558 million of Proposition 12 (the 1999 "Park Bond") money to fund the Park Playground Accessibility and Recycling Act Grant Program cycle one and cycle two respectively.

The CIWMB administered both cycles of the Park Playground Accessibility and Grant competitive grant program to meet the requirements of the act. Fifty percent of the grant funds must be used to purchase playground equipment made from recycled-content materials (PRC § 5096.310(x)). This grant program required the use of recycled-content materials and equipment to help conserve resources and develop markets for these products. The Park Playground Accessibility and Grant program is for the refurbishment of existing playgrounds, not for new construction. Playground upgrades are to be designed to increase accessibility and prevent injuries while satisfying the Department of Health Services' regulations, found in California Code of Regulations Title 22, Chapter 22. The grant program funded projects up to \$50,000 each, with total grant allocations not to exceed \$2.558 million for each grant cycle.

#### ***2.) Accomplishments as December 31, 2003***

1<sup>st</sup> cycle - Staff distributed the Notice of Funds Available (NOFA) on September 11, 2000 to 2,200 interested parties. The NOFA was also made available on the Board's web page. The application period extended from November 8, 2000 to January 31, 2001. By January 31, 2001, the Board received a total of 84 applications totaling \$3,708,243 in requested funding. Of the 84 applications received, 54 percent (44 applications) were from northern California and 46 percent (38 applications) applied for funds from southern California. The division of the state was as described above, and based on the estimated population of each county in January 1999, provided by the Department of Finance.

The funding requests from all passing applications totaled \$2,543,099. Of the 82 applications scored, 56 (68 percent) achieved a passing score. These included 33 applications from northern California (59 percent) and 23 applications from southern California (41 percent). Staff recommended that the Board award all 33 northern California projects for a total amount of



\$1,514,377 and all 23 southern California projects for a total amount of \$1,028,722. The combined total for the 56 projects is \$2,543,099. The first cycle of the Park Playground Accessibility and Recycling Grant Program closed April 2003.

2nd cycle - Staff distributed the Notice of Funds Available (NOFA) on May 30, 2001 to 2,200 California cities, counties park districts, special districts, and Qualifying California Indian tribes. The NOFA was also made available on the Board's web page. The application period extended from June 12, 2001 to August 31, 2001. On August 31, 2001, the Board received 113 applications. Staff returned 11 applications to the applicants. Three of the 11 applications returned were from ineligible school districts. This program is only eligible to park districts or public entities that fit the definition of park districts (as described in the grant application instructions). Eight of the 11 returned applications were from districts that submitted more than one application. Only one application per district was accepted for this program. The total grant amount requested, of the 102 eligible applications, was \$4,621,725. Northern California counties submitted 52 eligible applications (50.98 percent) and southern California counties submitted 50 eligible applications (49.02 percent).

Of the 102 applications scored, 57 (56 percent of those submitted) achieved a passing score; 27 applications from northern California (26 percent of submitted, or 47% of passing) and 30 applications from southern California (29 percent of submitted, or 53% of passing). The funding requests from all passing applications totaled \$2,620,189. The amount available from Proposition 12 funds is \$2.558 million. Staff recommended that the Board award all 57 applicants for a total amount of \$2,620,189. Since there was not enough Bond Fund monies to award all of the passing applicants, the Board provided funding to three passing applicants from the California Tire Recycling Management Fund. These three passing applicants included rubberized surfacing from 100% California waste tires in their playgrounds. The combined total for the 56 projects was \$2,543,099. The first cycle of the Park Playground Accessibility and Recycling Grant Program will close April 2004.

### ***3.) Planned Activities Over the Next Two Years***

Although there has been much interest for this program, there is no available funding. There are no planned activities for future Park Playground Accessibility and Recycling Grants.

### ***4.) Program Benefits to Children's Health***

Even though this is not a school program, school-age children directly benefit from the increased accessibility to public park playgrounds. Grant money from the Park Playground Accessibility and Recycling grant program has not only helped conserve resources and developed markets by using recycled-content material; it contributed to creating accessible playgrounds for school children. Both children and care-givers visiting public playgrounds benefit from accessible surfaces, surfacing that extends approved distances from equipment, play structures that are adequately spaced and accessible, elevated pieces of equipment that now have handrails, and equipment that do not have sharp points, pinch or entrapment hazards.

## ***5.) Recommendations***

Proposition 12 funded the Park Playground Accessibility and Recycling Grant Program. Through this program, the Board was able to fund 113 public playground projects. However, thousands of public playgrounds continue to violate the Department of Health Services' regulations. The State is suffering economically, however, this program is another example of an urgent need of funding to prevent further potentially life-threatening public playground accidents and injuries.

### **b. Waste Tire Playground Cover Grant and Waste Tire Track and Other Recreational Surfacing Grant Programs**

#### ***1.) Purpose and Requirements of the Legislation***

California is faced with the challenge of diverting or safely managing more than 33 million reusable and waste tires generated in the state each year. The number of waste tires generated each year continues to exceed the number of tires diverted from landfill disposal and stockpiling. As a comprehensive measure to extend and expand California's regulatory program related to the management of waste and used tires, Senate Bill (SB) 876 (Chapter 838, Statutes of 2000, Escutia) was enacted. The measure's key provisions include increasing the tire fee from \$0.25 to \$1.00 per tire (bringing California in line with other large states) until December 31, 2006, and reducing it to \$0.75 thereafter. These fees established the California Tire Recycling Management Fund (Tire Fund). The California Integrated Waste Management Board (CIWMB) receives an annual appropriation from the Tire Fund to administer the Tire Recycling Act (Act) (Statutes of 1989, Chapter 974) and related legislation. This Act provides for the Board to award grants to local governments. Further, PRC 42872(a) allows for the awarding of grants to public entities involved in activities and applications that result in reduced landfill disposal or stockpiling of waste tires and section PRC 42889(g) requires CIWMB to assist in developing markets for waste tires. The CIWMB offers both the Waste Tire Playground Cover Grant Program and the Waste Tire Track and Other Recreational Surfacing Grant Program to encourage the reduction of landfill disposal and stockpiling of California waste tires.

In the Board-approved Five-Year Plan, staff proposed funding for the next five fiscal years at \$800,000 per fiscal year for playground cover (with a maximum of \$25,000 per grant) and funding for the next three fiscal years at \$800,000 per fiscal year for track and other recreational surfacing (with a maximum of \$100,000 per grant).

#### ***2.) Accomplishments as of January 1, 2002***

Since the last report, 90 playground cover grants totaling \$2,110,282 have been awarded to public entities in California including school districts. Additionally, 47 Track and Other Recreational Surfacing grants totaling \$3,722,834 were awarded to public entities in California most of them were to school districts.

Notice of Funding Available for the Track and Other Recreational Surfacing Grant Program for fiscal year 2003/2004 was released in August 2003. The CIWMB anticipates awarding successful grantees in March of 2004. In the Board-approved Five-Year Plan, staff proposed

funding for the next five fiscal years at \$800,000 per fiscal year for playground cover (with a maximum of \$25,000 per grant) and funding for the next three fiscal years at \$800,000 per fiscal year for track and other recreational surfacing (with a maximum of \$100,000 per grant).

### ***3.) Planned Activities Over the Next Two Years***

Both the Playground Cover and the Track and Other Recreational Surfaces Grant Programs will be offered on an annual basis for the next two years. More information on these grant programs can be obtained at [www.ciwmb.ca.gov/tires/grants](http://www.ciwmb.ca.gov/tires/grants). To be notified when the grant offerings are made, public entities can be placed on our mailing list by calling (916) 341-6441.

### ***4.) Program Benefits to Children's Health***

Eligible projects for the Playground Cover Grant Program and the Waste Tire Track and Other Recreational Surfacing Grant Program are required to include surfacing material that is placed underneath and around playground equipment and recreational sites respectively. The children of California will benefit from having safe, durable, economical and accessible surfacing at playgrounds and recreational sites. These grant programs benefit children of all ages directly by improving safety, accessibility and quality of the facilities in which they play and run. They benefit children indirectly by helping to maintain the quality of the environment for which they will assume responsibility as adults. They encourage the use of materials diverted from California landfills and the use of environmentally preferable practices, products, and technologies. These grant programs benefit children of all ages directly by improving safety, accessibility and quality of the facilities in which they play and run. They benefit children indirectly by helping to maintain the quality of the environment for which they will assume responsibility as adults.

### ***5.) Recommendations***

The rubberized surfacing is the preferable product for safety accessibility, and quality of facility; however, many public entities still cannot afford the cost of installation and materials. The CIWMB is adjusting the competitive grant program to make it easier for public entities to qualify for the grants, and progress is being made each year. Continued funding for these programs is recommended in the CIWMB-approved Five-Year Plan.

## ***6. Art Hazards Program***

### ***a. Purpose and Requirements of Legislation***

On June 1, 1987, the *Education Code: Article 6, Section 32060* was enacted. This law helps to assure that school children are sufficiently protected from art and craft materials that may be seriously harmful. The law prohibits California school districts from purchasing products containing toxic or carcinogenic substances for use in grades K-6. The law also restricts the purchase of such products in grades 7-12, allowing their use only if they bear a label informing the user of the presence of hazardous ingredients, the potential health effects, and instructions for safe use for the art or craft products. This law does not restrict the purchase of art and craft or other materials for use by instructors when young children are not present.

**b. Accomplishments as of January 1, 2004**

The Integrated Risk Assessment Section (IRAS) of the Office of Environmental Health Hazard Assessment compiled a list of products that cannot be purchased. This list is updated quarterly. IRAS has also assembled guidelines for the safe use of art and craft materials. These guidelines assist both public and private schools in California to assure that school children are not exposed to hazardous art and craft materials.

**c. Planned Activities over the Next Two Years**

The Integrated Risk Assessment Section will continue to update the guidelines and the list on a quarterly basis.

**d. Program Benefits to Children's Health**

This legislation helps California schools ensure the safety of children in classroom arts and craft programs.

**e. Recommendations**

Continued support of this legislation will help ensure that children are not exposed to toxic chemicals contained in some arts and crafts materials purchased by public schools.

**7. Lower-Emission School Bus Program****a. Purpose and Requirements of Legislation**

The purpose of the Lower-Emission School Bus Program is to reduce school children's exposure to both cancer-causing and smog-forming pollution. As approved by the Air Resources Board (ARB) in December 2000, the program was designed to reduce harmful emissions of diesel particulate matter and oxides of nitrogen through two program components:

- A new school bus purchase and infrastructure component to replace pre-1987 model year school buses (which are the oldest, most polluting school buses in California) with new, lower-emitting buses meeting the latest federal motor vehicle safety standards; and
- A retrofit component to equip in-use diesel school buses with ARB-verified exhaust emission control devices that significantly reduce toxic diesel particulate matter.

The program began in 2000 with a \$50 million allocation from the General Fund for the 2000 – 2001 fiscal year. The program subsequently received an additional \$16 million allocation for the 2001 – 2002 fiscal year. In December 2000, the ARB approved the guidelines for the expenditure of the program funds and for implementing the program throughout California.

The guidelines approved by the ARB have been used by the California Energy Commission (CEC), which is responsible for direct implementation of the new bus purchase and infrastructure component throughout many regions in California, and by the participating local air quality management and air pollution control districts, which are responsible for direct implementation of the program's retrofit component. Some local air districts also sought and received authorization by the CEC and ARB to directly implement the new bus purchase and infrastructure program component in their respective regions.

Funding to continue the Lower-Emission School Bus Program through the 2002 – 2003 and 2003 – 2004 fiscal years is provided through Proposition 40, California's Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act (Public Resources Code section 5096.650). Assembly Bill 425 (Statutes of 2002, Chapter 379) directs that 20 percent of the Proposition 40 funds available to the ARB shall be allocated for the acquisition of "clean, safe, school buses for use in California's public schools that serve pupils in kindergarten and grades 1 to 12, inclusive." For the 2002 – 2003 fiscal year, this means that \$4,920,000 was available for the purchase of new safe, lower-emitting school buses. In the 2003 – 2004 fiscal year, approximately \$4,600,000 will be available for the purchase of new, lower-emitting school buses, pending legislative budget approval. Funds provided for the program through Proposition 40 may not be used for the retrofit program component.

**b. Accomplishments for January 1, 2002 - December 31, 2003**

During the 2000 – 2001 and 2001 – 2002 fiscal years, the program provided \$49,500,000 for the purchase of approximately 440 new, lower-emitting school buses. The local air districts that administered their own new bus purchase and replacement programs were also required to contribute, at a minimum, an amount equal to 10 percent of their state funding allocation. Therefore, six local air districts provided a total of \$8,090,079 from their respective local funds for the purchase of about 90 more new, lower-emitting school buses. All new school buses purchased with 2000 – 2001 and 2001 – 2002 fiscal year funds were delivered to school districts and on the road by late 2002.

The in-use diesel school bus retrofit component of the program is ongoing and completion is expected in the spring of 2004. To date, over two-thirds of the \$16,500,000 available for school bus retrofits has been used to equip approximately 1,500 in-use diesel school buses with catalyzed diesel particulate filters that reduce particulate matter emissions by 85 percent.

In March of 2003, the ARB approved revisions to the original guidelines for program implementation. The guidelines provided updated regional funding allocations from the Proposition 40 funds for the 2002 – 2003 fiscal year and updated program criteria to reflect recent changes in heavy-duty engine emission standards.

**c. Planned Activities for the Next Two Years**

The ARB expects completion of the retrofit component of the program in the spring of 2004. With the remaining funds available for school bus retrofits, approximately 1,500 in-use school buses will be equipped with diesel oxidation catalysts (rather than catalyzed diesel particulate

filters) that reduce particulate matter emissions by 25 percent (these are in addition to the 1,500 school buses equipped with diesel particulate filters).

Also in the spring of 2004, the ARB staff intends to propose additional modifications to the program guidelines to again update program criteria and update regional funding allocations for the 2003 – 2004 fiscal year Proposition 40 funds.

Finally, the ARB staff expects delivery of all new school buses (approximately 45 statewide) purchased with 2002 – 2003 Proposition 40 funds by September 1, 2004, as is required by the current program guidelines.

#### **d. Program Benefits to Children's Environmental Health**

To date, state funding for this program has replaced over 400 old, high-polluting pre-1987 model year school buses on California's roadways with new, lower-emitting models equipped with the latest safety equipment. The benefits for school children are two-fold – more children are transported in the safest buses available and their exposure to harmful pollutants is reduced. Additionally, about 3,000 in-use diesel school buses will be equipped with exhaust emission control devices that significantly reduce diesel particulate matter thus further reducing school children's exposure to toxic emissions. The benefits to children's environmental health accrue from reduced exposures to diesel particulates and exhaust while riding school buses as discussed in Sec. II C 2 of this report.

#### **e. Recommendations**

Continued support of legislative funding mechanisms will help ensure that more old, high-polluting school buses can be removed from service or equipped with exhaust emission control devices to significantly reduce school children's exposure to cancer-causing and smog-forming pollution.

### ***III. Children's Environmental Health Studies***

#### **A. The Vulnerable Populations Research Program**

##### ***1. Purpose and Requirements of the Legislation***

On July 1999 the Vulnerable Populations Research Program (VPRP) was authorized by the Californian Legislature and Governor Gray Davis. The purpose of the VPRP is to provide the scientific support, through research efforts, for ARB's regulatory and non-regulatory programs that aim to protect all of California's citizens, especially those subpopulations considered vulnerable, from the adverse effects of air pollution. The VPRP plan will identify susceptible subpopulations, and quantify the degree to which their health is compromised, and will characterize their exposures to air pollutants. Historically, research efforts designed to fill gaps on air pollution impacts on the most vulnerable members of society have focused on children, the elderly, and people with pre-existing cardiovascular and/or pulmonary disease, and individuals who spend a large amount of time out-of-doors. Recent actions taken to address the requirements of SB 25 add emphasis to the need to study children's health.

##### ***2. Accomplishments as of January 1, 2004***

The VPRP 2003 Progress Report and Research Plan was finalized in August 2003. This progress report and research plan, which can be found at [www.arb.ca.gov/research/vprp/vprp.htm](http://www.arb.ca.gov/research/vprp/vprp.htm), provides the framework necessary to guide project sponsorship under the auspices of the VPRP. The Report provides detailed information on the background of the VPRP, the progress of research initiated under the VPRP, and data gaps and recommended research. As a result of the needs for sound scientific foundations to the ARB programs such as, ambient air quality standard setting, the toxic air contaminant identification and control program and the environmental justice program, we have identified 8 broad research questions with remaining data gaps regarding vulnerable populations where children are a main focus.

##### ***3. Planned Activities for the Next Two Years***

Using the 2003 VPRP Research Plan, the ARB will identify priority research areas to identify vulnerable populations, quantify the degree to which their health is compromised, and characterize their exposures to air pollution. In addition, the ARB will use internal resources to conduct exposure assessment and analysis of health databases as part of the VPRP. We have identified 8 broad research questions with remaining data gaps regarding vulnerable populations where children are a main focus.

1. Which populations have heightened susceptibility to air pollution and what are the factors that contribute to increased susceptibility?
2. Which pollutants and what levels of those pollutants cause health effects? What pollutant characteristics are most responsible for the health effects?
3. Does air pollution influence the development and progression of disease?

4. When and where in an individual's lifetime do the most harmful exposures occur? When is a person most vulnerable to air pollution?
5. Are health outcomes correlated with air pollution exposures?
6. Have air pollution control programs improved air quality and health in all communities?
7. Which communities are most impacted by air pollution? What are their cancer and non-cancer health effects?
8. What screening methods can be used to identify the most impacted communities and individuals?

#### ***4. Benefits to Children's Environmental Health***

Research initiated and planned under the VPRP and related programs will shed light on some of the environmental factors that influence the behavior of childhood asthma and other respiratory health effects caused or exacerbated by air pollution. The information obtained from research sponsored through this plan will be used in the development and evaluation of ambient air quality standards and other air pollution related public health policies implemented at the State and community level that are designed to protect against the harmful health effects of pollutants.

#### ***5. Recommendations***

The Vulnerable Populations Research Program's 2003 Progress Report and Research Plan contains recommendations and priorities for future research activities that will fill data gaps that will allow us to better understand the health effect of air pollution on children which are not being addressed by other funding organizations.

### **B. Southern California Children's Health Study**

#### ***1. Purpose and Requirements of the Legislation***

Understanding the adverse health effects of air pollution on children is important since children are especially vulnerable to air pollution. Children's respiratory and immune systems are still developing, and they breathe more rapidly and are more physically active than adults. Little is known about the health effects of long-term air pollution exposure on children. The Children's Health Study, a 10-year study of the health effects of children's long-term exposures to southern California's high concentrations and unique mixtures of air pollutants, is providing important new information on the health impacts of air pollution on children. This information will be useful in the setting of ambient air quality standards to protect this vulnerable population. More information can be found at: [www.arb.ca.gov/research/chs/chs.htm](http://www.arb.ca.gov/research/chs/chs.htm).

#### ***2. Accomplishments for January 1, 2002 – December 31, 2003***

The Children's Health Study has enrolled a total of over 6,000 children in 12 communities with varying mixtures of air pollutants; 3,600 of them were enrolled as fourth graders and are being followed through high school graduation. The children's pulmonary function is measured



annually; questionnaires ascertain information about respiratory symptoms and illnesses and numerous factors known to affect relationships between air pollution and health. Air pollution monitoring in the 12 communities provides information about exposures to ozone, nitrogen dioxide, nitric oxide, carbon monoxide, acid vapor, particulate matter less than 10 microns in diameter (PM<sub>10</sub>), particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>), elemental and organic carbon (both PM<sub>10</sub> and PM<sub>2.5</sub>), and the number of ultra-fine particles (less than 0.1 micron in diameter). Measurements and modeling of personal exposures to ambient air pollution related to motor vehicle emissions is ongoing.

The Children's Health Study has yielded many important results. For example, children living in communities with higher concentrations of nitrogen dioxide, particulate matter, and acid vapor have been shown to have lower rates of lung function growth. Poorer adult respiratory health may be a long-term consequence of these deficits in growth. An improvement was seen in the rate of lung function growth in children who moved from the more polluted communities to communities of lower PM<sub>10</sub>. The rate of lung function growth was reduced when children moved from less polluted communities to communities with higher PM<sub>10</sub>. School absence rates increased with daily variations in ozone levels, especially in communities with low PM<sub>10</sub> and nitrogen dioxide. Asthmatic children had more bronchitis if they lived in communities with more nitrogen dioxide or particulate pollution. Children who played three or more team sports and spent more time outside in high ozone communities had a higher incidence of newly diagnosed asthma.

### ***3. Planned Activities for the Next Two Years***

The investigators will consolidate and compile all of their findings in a final report to be delivered to the ARB in the spring of 2004. These findings will include recent areas of research, such as the effects of proximity to traffic (vehicle emissions) in relation to lung function, asthma exacerbation, and possibly asthma causation and the effects of exposure to ultra-fine particles. The monitoring network has recently added the capability to monitor for ultra-fine particles (0.007 to 0.1 micron in diameter), making it one of the only areas in the world with an ultra-fine monitoring network.

ARB's funding support of the Children's Health Study ceases after June 30, 2004. Under the auspices of an NIEHS grant, however, the investigators will continue the monitoring effort and health measurements for an additional three years. ARB has a data sharing agreement in place with the investigators and will be providing limited monitoring data to the investigators – this will allow the ARB to maintain contact with this important study.

The investigators are expected to continue performing many more analyses of the Study's very rich data base during the next two years, and many more important results are anticipated, possibly including findings suggesting causal relationships between pollution and health effects. In addition, subjects will be re-contacted and re-tested after they have attained maximum lung growth to determine whether the previously observed lung growth deficits are permanent.

#### ***4. Benefits to Children's Environmental Health***

The Children's Health Study is the first large-scale study of children to examine the impacts of long-term air pollution exposures. In addition, the study is able to look at sensitive children such as asthmatics that may be even more vulnerable to the impacts of air pollution. This information will be useful in guiding health policies to protect children from the harmful effects of air pollution.

#### ***5. Recommendations***

The results seen from this long-term study point out the need for continued reductions in the levels of air pollutants to reduce the impacts of these pollutants on children, one of our sensitive populations.

### **C. Fresno Asthmatic Children's Environment Study (FACES)**

#### ***1. Purpose***

The Fresno Asthmatic Children's Study (FACES) is the first project to be funded through the ARB's Vulnerable Populations Research Program. FACES is designed to examine the acute and chronic health effects of particulate air pollution on the natural history of asthma in young children. The Fresno area was selected for the study since there is a high prevalence of asthma among the children in Fresno, a highly ethnically diverse population and high levels of ambient air pollution, especially particulate matter. The study is being conducted by a team of researchers from a number of organizations, led by the University of California, Berkeley. Additional information can be found at:

[www.arb.ca.gov/research/faces/faces.htm](http://www.arb.ca.gov/research/faces/faces.htm).

#### ***2. Accomplishments for January 1, 2002 – December 31, 2003***

A cohort of up to 250 children between the ages of 6 and 11 living in the Fresno/Clovis area who have been diagnosed by a doctor with asthma, began being recruited into the study in 2000. Recruitment is continuing.

The study is investigating the relationships of air pollutants on acute exacerbations of asthma, the critical exposures leading to the observed acute health effects, the cumulative effects of repeated acute responses to short-term air pollution exposures on the progression of the children's asthma, and the biological or exposure characteristics of groups of children who are more or less responsive to a given exposure. These questions are being addressed by a series of panel studies to assess the short-term effects and a longitudinal study to assess the cumulative effects.

The panel and longitudinal studies began with the initial recruitment of the study participants and will continue until the end of the study in 2005. The panel studies involve observations of groups of children during three 14-day panel periods per year. During the panel periods the children

record the results of twice-daily lung-function tests, asthmatic symptoms, medication usage, and time/location/activity patterns. The longitudinal component involves each subject undergoing detailed health evaluations initially and every six months thereafter.

Parallel to the health studies, the FACES project involves a detailed examination of the air pollution exposure of the children. Ambient pollutant data from the Fresno First Street air monitoring station will be used for the duration of the study. In addition, highly instrumented monitoring trailers were placed at schools for a period of 14 months during 2002 and 2003. One of the trailers continuously monitored the ambient air quality at Fremont school for the entire period, while the other trailer was moved to a different school approximately every six weeks. The data from these trailers, combined with concurrent data from the First Street station, will be used to determine the spatial and temporal patterns of pollution across the Fresno/Clovis area.

A series of 100 home-intensive exposure measurements has also been conducted during the panel studies in 2002. These home-intensive measurements are conducted using a specially designed, freestanding, portable instrument system that contains instruments for measuring ozone, nicotine, fungal spores, pollen grains, PAHs, and a variety of other particulate related parameters. These instrument systems were designed to be as quiet and unobtrusive as possible. At each of two to five homes per panel one unit was placed in the home (in the living room) and one unit placed outside the home.

### ***3. Planned Activities for the Next Two Years***

During the next two years the six-month health assessments will continue, as will the triannual two-week intensive health panel studies.

The ambient air exposure assessments from the Fresno First Street monitoring station will continue. A model will be created using the results of the trailer studies to determine the spatial and temporal variation across the Fresno/Clovis area to estimate the exposure levels in the specific areas where the children live, play, and attend school based on the pollutant levels measures at the First Street monitoring station.

These next two years will see extensive data analysis. A final report will be completed by August 2005.

### ***4. Benefits to the Children's Environmental Health Program***

This study will shed light on some of the environmental factors that influence the nature of childhood asthma as children grow. The information obtained through this project will be used in the development and evaluation of ambient air quality standards and other air pollution related public health policies implemented at the State and community levels that are designed to protect against the harmful health effects of pollutants. These actions will lead to improvements in the protection of this highly vulnerable subgroup (asthmatic children) of the population and can potentially significantly reduce the direct and indirect asthma-related costs borne by all Californians.

## ***5. Recommendations***

Recommend continued funding through the conclusion of the project.

### **D. Evaluation of Health Effects of Toxic Air Pollutants in a Southern California Community: A Pilot Study**

#### ***1. Purpose and Requirements of the Legislation***

A limited amount of information exists on the health effects of volatile organic compounds (VOCs) in the general population, and specifically in children with preexisting health conditions. This pilot study was undertaken to evaluate the association of exposure to VOCs and measures of health in asthmatic children. The investigation included an exposure assessment portion used to estimate the associations between exhaled breath, personal breathing zone, indoor and outdoor concentrations of VOCs and the observed health effects in sensitive populations, including asthmatics. The findings from this study, coupled with experimental and other epidemiologic evidence in the literature, suggest that the pro-inflammatory and irritant nature of traffic-related pollutants can lead to adverse effects in asthmatic children.

#### ***2. Accomplishments for January 1, 2002 – December 31, 2003***

Evaluation of Health Effects of Toxic Air Pollutants in a Southern California Community: A Pilot Study yielded many important results. The report is complete, and can be downloaded at <http://www.arb.ca.gov/research/health/healthres.htm>. Briefly, the investigation reported associations between bothersome or more severe asthma symptoms recorded in diaries and breath concentrations of benzene. Ambient VOCs (including benzene, toluene, *m,p*-xylene, and *o*-xylene), measured on the same day as breath VOCs, showed notably stronger and significant associations with symptoms. Generally, indoor VOC concentrations were higher than breath VOCs. Personal exposures correlated well with indoor exposures, but did not correlate with outdoor measurements for most VOCs.

#### ***3. Planned Activities for the Next Two Years***

The results of this study will be used in future ARB sponsored studies where the impact of VOCs alone, and in combination with criteria air pollutants, are to be investigated.

#### ***4. Benefits to Children's Environmental Health***

This study has provided much needed information to the sparse amount of literature regarding a) exposure to VOCs; b) the association between VOC exposure and health endpoints in an asthmatic cohort; and c) the association between VOC and criteria air pollutant exposure, and health endpoints in an asthmatic cohort. This information will be useful in evaluating the ambient air quality standards for criteria air pollutants and for considering control measures for VOCs.

## **5. *Recommendations***

This study contributes to our understanding of the adverse health effects of air pollution on asthmatic children. More research in different populations using different study designs and techniques will add to our knowledge of adverse respiratory effects from VOC exposure and air pollution.

### **E. Children's Respiratory Health Study**

#### **1. *Purpose***

OEHHA sought and received funding through the formal budget change proposal process to conduct studies on health effects related to vehicular fuel usage. A portion of the funding was used to conduct an epidemiological study of the respiratory health impacts of traffic-related pollutants on children.

#### **2. *Accomplishments for January 1, 2002 - December 31, 2003***

OEHHA completed a cross-sectional study of children in the East Bay to examine the association between measurements of traffic and children's respiratory health. Respiratory health surveys were obtained on approximately 1100 children (8-10 years old) recruited from ten schools in three East Bay communities (Oakland, San Leandro, and Hayward). The ten schools were chosen to reflect neighborhoods that are near or far from major freeways. Ambient concentrations of traffic-related air pollutants (e.g., nitrogen oxides and particulates) were measured over several seasons. The analysis evaluated the relationship between ambient concentrations of pollutants found at the ten schools and the density and proximity of traffic on roadways and freeways using geographic information system (GIS) methods. The study also examined whether there is an association between reported respiratory symptoms and exposure to traffic-related air pollutants.

The results of the study indicate a correlation between the proximity of a child's school and home to major roadways and the incidence of asthma symptoms and chronic bronchitis. There was also a correlation between traffic-related pollutant measurements and exacerbation of asthma and chronic bronchitis.

#### **3. *Planned Activities for the Next Two Years***

Further study of correlations between traffic-related pollutants and children's respiratory health was terminated due to budgetary constraints during the 2002-2003 fiscal year. Outside funding is being sought to continue this issue.

#### **4. *Program Benefits to Children's Environmental Health***

Traffic-related pollutants include several criteria air pollutants for which California has Ambient Air Quality Standards. The information obtained through this project would have been used in

the development and evaluation of ambient air quality standards. The results of the study would also have been supportive of other State and local air pollution-related public health policies designed to protect against the harmful health effects of traffic-related pollutants. When implemented, such actions will lead to improvements in the protection of a highly vulnerable subgroup (asthmatic children), and can potentially make significant reductions in the direct and indirect asthma-related costs borne by all Californians. This study provided information that was used to develop legislation to prohibit the siting of schools very close to major roadways (SB 352, Escutia, 2003)

### *5. Recommendations*

Further study of the correlations between traffic-related pollutants and children's respiratory health was curtailed due to the budgetary constraints during the 2002-2003 fiscal year. Reconsideration of support for this effort as soon as feasible is recommended. The evaluation of health effects due to traffic-related pollutants has already proven valuable and will provide more information to policymakers regarding protecting the health of children in California.

#### ***IV. Activities of the Children's Environmental Health Center***

##### **A. Provide Advice to the Secretary for Environmental Protection and the Governor**

###### ***1. Purpose and Requirements of the Legislation***

The Children's Environmental Health Act (Chapter 731, Statutes of 1999) created within the Office of the Secretary for Environmental Protection the Children's Environmental Health Center (CEHC). The CEHC "serves as the chief advisor to the Secretary for Environmental Protection and to the Governor on matters within the jurisdiction of the Environmental Protection Agency relating to environmental health and environmental protection as each of those matters relates to children (HSC Sec. 900(a))."

###### ***2. Accomplishments for January 1, 2002 – December 31, 2003***

During this period, the CEHC was managed by an Assistant Secretary for Children's Environmental Health and an Assistant Director of the CEHC. The Asst. Secretary worked with the Secretary to elevate the awareness of childhood asthma attributable to environmental causes by formally endorsing the California Department of Health Services' Asthma Strategic Plan. Through the Secretary's designated representative to the Environmental Council of the States (ECOS), California endorsed the Asthma Action Agenda adopted by ECOS and the Association of State and Territorial Health Officials (ASTHO) in 2003. The Asst. Director of CEHC appeared twice as an expert witness on childhood asthma in front of the Senate Select Committee on California's Children's Readiness and Health.

###### ***3. Planned Activities for the Next Two Years***

The CEHC will continue to advise the Secretary and the Governor on matters pertaining to children's environmental health, part of which is in the form of the recommendations that appear at the end of each section of this biennial report.

###### ***4. Program's Benefit to Children's Environmental Health***

Cal/EPA's endorsement of the California Department of Health Services' (DHS) 2002 Strategic Plan for Asthma and the ECOS-ASTHO Asthma Action Agenda has increased the commitment of Cal/EPA to work towards reducing the environmental triggers of asthma. The accomplishments of the California Air Resources Board (ARB) in reducing particulate emissions from diesel vehicles (see Sec. I C 4) and school buses (see Sec. II C 2 and II D 4) significantly reduces one of the triggers of asthma. The research studies conducted by ARB and the Office of Environmental Health Hazard Assessment (OEHHA) on the causes and triggers of childhood asthma (see Sec. III) will help to reduce the sources that contribute to this disease.

## ***5. Recommendations***

Continue the active involvement of the CEHC in its advisory capacity to the Secretary, the Governor and the Legislature.

### **B. Coordination of Program Activities**

#### ***1. Purpose and Requirements of the Legislation***

Under Sec. 900(c) of the Health and Safety Code, the CEHC is tasked with "coordinating within the Environmental Protection Agency and with other state agencies, regulatory efforts, research and data collection, and other programs and services that impact the environmental health of children, and coordinate with the appropriate federal agencies conducting regulatory efforts and research and data collection."

#### ***2. Accomplishments for January 1, 2002 – December 31, 2003***

In January of 2002, the CEHC published and posted on Cal/EPA's web site the first biennial report on children's environmental health activities within the Cal/EPA. In 2003, the Secretary's designated representative to ECOS made a presentation to the Governor of Arizona and its Environmental Commissioner on California's children's environmental health programs and activities. The report was used by the Arizona Department of Environmental Quality to help establish a children's environmental health program for Arizona.

On April 22, 2002, the CEHC in collaboration with Cal/EPA's boards, departments, and offices hosted the first Children's Environmental Health Awareness Day at Cal/EPA's new headquarters building. Eighteen speakers drawn from the California Senate, U.S. EPA's Office of Children's Health Protection, Children's Environmental Health Network, South Coast Air Quality Management District, and Cal/EPA's boards, departments and offices discussed current issues in children's environmental health. Thirty poster presentations were available on the Mezzanine level and in the Sierra Hearing room.

In 2002, the CEHC joined with DHS' California Asthma Public Health Initiative to form the California Interagency Asthma Interest Group (CIAIG). The CIAIG provides a forum for the exchange of information on programmatic activities pertaining to children's asthma among Cal/EPA's boards, departments and offices, DHS, other state agencies and non-profit groups.

During all of 2002 and early 2003, the CEHC participated in the development of an Asthma Action Agenda for the states by ECOS and ASTHO sponsored by U.S. EPA's Office of Children's Health Protection. In October, CEHC hosted a workshop in Sacramento on the outdoor triggers of asthma in children. CEHC participated in three other out-of-state workshops and a final workgroup meeting in New Orleans to draft the Asthma Action Agenda ("Catching Your Breath: Strategies to Reduce Environmental Factors that Contribute to Asthma in Children"). The Agenda was published in May 2003 and is available at



<http://www.astho.org/pubs/CatchingYourBreathReport.pdf> . This report formed the basis for a grant proposal jointly submitted by the CEHC and DHS to ECOS in 2003.

During most of 2003, the CEHC participated in writing portions of the Seventh Report of the Good Neighbor Environmental Board (GNEB) with its focus on children's health issues along our border with Mexico. This report is prepared for the GNEB under the auspices of U.S. EPA Region 9 and is scheduled for completion in early 2004. The report will be delivered to the President and Congress by the Chair of the GNEB.

Throughout 2002 and 2003, CEHC met with U.S. EPA Region 9's Children's Health Coordinator on issues of safe and healthy schools and other children's environmental health issues. CEHC provided external peer review of U.S. EPA's 2003 report on "America's Children and the Environment: Measures of Contaminants, Body Burdens, and Illness." This report is U.S. EPA's effort to develop environmental indicators of children's health. California is frequently acknowledged in this report for its in-depth programs and large database of environmental contaminants that are related to children's exposures and health.

In 2003, CEHC in partnership with DHS' California Asthma Public Health Initiative (CAHPI) competitively applied for and was awarded funding from ECOS to implement parts of the ECOS-ASTHO Asthma Action Agenda (see planned activities below).

In 2003, CEHC, ARB and CAPHI competitively applied for funding from U.S. EPA's Office of Children's Health Protection to implement parts of the Asthma Action Agenda related to outdoor triggers of asthma. The joint grant proposal would establish an on-line bilingual air quality and health information center for Imperial Valley in southern California. Grant awards will be made in early 2004. The ARB, in partnership with CEHC, applied for funding from U.S. EPA's Border 2012 program for a similar project on both sides of the California-Mexico border. This project would include enhanced air quality monitoring in Mexicali on the south side of the border, which is the origin of most of the air pollution affecting the Imperial Valley. The ARB received funding for this project in November 2003.

### ***3. Planned Activities for the Next Two Years***

In collaboration with the California Asthma Public Health Initiative (CAPHI), the CEHC will complete a research project funded by ECOS in September of 2003. The project examines the flow of information on air quality and its health effects from the local air quality management districts to the local school districts, the schools, and the teachers, school nurses and coaches. The project also looks at different school policies for managing outdoor activities for children when the air quality is deemed "unhealthy for sensitive groups (primarily children with asthma)." This is a grey area where healthy children may not be affected nearly as much as children with asthma. A goal is to find options for children who are at greater risk from poor air quality and still meet their needs for physical exercise. The project concludes with a final project report to ECOS in August of 2004 and posting of the results on CEHC's and CAPHI's Web pages.

In collaboration with ARB and CAPHI, CEHC will work to implement the grant awarded to ARB for air quality monitoring and health information dissemination in the Calexico-Mexicali region of

Imperial Valley. If CEHC is funded by U.S. EPA's Office of Children's Health Protection, ARB, CAPHI, and CEHC will establish the bilingual on-line health information center in Calexico and evaluate the effectiveness of the information to reduce absenteeism in the Calexico Unified School District (USD). The Calexico USD has agreed to partner in disseminating air quality and health information to its schools, school teachers, coaches and school nurses. The combined grants would allow a unique opportunity to evaluate the effectiveness of access to air quality and health information in reducing absenteeism due to asthma among children in the Calexico USD. No such information exists today in this area of California in spite of its poor air quality and high prevalence of asthma.

When state funding becomes available, the CEHC will sponsor a second Children's Environmental Health Awareness Day. In the fall of 2004, the CEHC will co-host the second "Catching Your Breath" conference on childhood asthma put on by ECOS and ASTHO with funding from U.S. EPA's Office of Children's Health Protection.

#### ***4. Program Benefits to Children's Health***

Coordination of children's environmental health activities within Cal/EPA brings together similar efforts resulting in improved use of resources among the various programs in the boards, departments and offices. The CEHC serves as initial point of contact by outside agencies and the public in seeking information on children's environmental health issues. This allows a ready referral to the Cal/EPA program best able to respond. Coordination of children's environmental health activities within Cal/EPA has resulted in greater public awareness of children's health issues through the Children's Environmental Health Awareness Day, the biennial reports, and the CEHC Web page.

The benefits of CEHC's research projects to children's health will be better informed teachers, school nurses, and coaches with regard to the most appropriate outdoor activity levels for children when air quality begins to degrade. Better protection of children from poor air quality should reduce exacerbation of their asthma and school absenteeism.

#### ***5. Recommendations***

Some amount of state funding for programmatic activities would greatly enhance public outreach efforts. This should be looked at in the FY 05-06 budget cycle.

### **C. Assisting the Boards, Departments and Offices in Effectiveness of Regulations**

#### ***1. Purpose and Requirements of the Legislation***

Under Sec. 900(b), the CEHC is "to assist the boards, departments, and offices within Cal/EPA to assess the effectiveness of statutes, regulations, and programs designed to protect children from environmental hazards."

## ***2. Accomplishments for January 1, 2002 – December 31, 2003***

In 2002, the CEHC supported the 2001 recommendation by the Department of Toxic Substances Control to increase their authority in school site assessments to include existing schools, not just new school construction projects, where hazardous substances and wastes have been found. The Center continues to support this position.

In 2003, the CEHC strongly supported the ARB's Air Toxics Control Measure to reduce school bus idling near or on a school campus or bus stop. The CEHC strongly supported funding the upgrade and replacement of aging school buses in California.

Through the Seventh Report of the Good Neighbor Environmental Board, the CEHC highlighted a deficiency in current federal rules regarding required reporting of air quality to the public. The CEHC recommended that the threshold population requirement for reporting poor air quality include counting populations on both sides of an international border that share a common air basin. Air pollution does not stop at the border.

## ***3. Planned Activities for the Next Two Years***

The CEHC will continue to work with Cal/EPA boards, departments and offices in evaluating the effectiveness of current regulations.

## ***4. Program Benefits for Children's Health***

Working to improve regulations and programs that provide cleaner transportation and cleaner outdoor and indoor air for children should improve lung development and respiratory health.

## ***5. Recommendations***

The CEHC will work to improve its advocacy role for children's environmental health in the regulatory arena.

# **D. Reporting Requirements**

## ***1. Purpose and Requirements of the Legislation***

Under Sec. 901(h), the CEHC "on and after January 1, 2002, and biennially thereafter, shall report to the Legislature and the Governor on the implementation of this section as part of the report required by Sec. 900(d)." Further, the report shall " . . . include, but not be limited to, information on revisions or modifications made by the office (OEHHA) and other entities within the Cal/EPA to cancer potency values and other numerical health guidance values in order to be protective of children's health. The report shall also describe the use of the revised health guidance values in the programs and activities of the office (OEHHA) and other boards and departments within the Cal/EPA."

## ***2. Accomplishments for January 1, 2002 – December 31, 2003***

The first biennial report was sent to Governor Gray Davis and the Legislature in January 2002 under the statutory requirements of Secs. 900(d) and 901(h) of the Health and Safety Code. The current biennial report was prepared in 2003 under the requirements of Sec. 901(h) of the Health and Safety Code.

## ***3. Planned Activities for the Next Two Years***

A third biennial report will be prepared in the fall of 2005. With the development of guidance for risk assessments at schools, some health reference values will be changed to be more protective of children in 2004.

## ***4. Program Benefits for Children's Health***

The biennial reports of the CEHC are posted at <http://www.calepa.ca.gov/childhealth> . The public availability of work conducted on children's environmental health issues by Cal/EPA boards, departments and offices allows other state, federal, and local programs to benefit from our knowledge and experiences.

## ***5. Recommendations***

Continue publishing and disseminating the biennial reports.

## V. REFERENCES

### A. Senate Bill 25 (CHAPTER 731, STATUTES OF 1999)

FILED WITH SECRETARY OF STATE OCTOBER 10, 1999

APPROVED BY GOVERNOR OCTOBER 7, 1999

PASSED THE SENATE SEPTEMBER 8, 1999

PASSED THE ASSEMBLY SEPTEMBER 7, 1999

INTRODUCED BY Senator Escutia

(Principal coauthors: Assembly Members Kuehl and Villaraigosa)

(Coauthors: Senators Alarcon, Figueroa, Ortiz, Perata, Polanco, Sher, Solis, and Speier)

(Coauthors: Assembly Members Alquist, Aroner, Firebaugh, Honda, Jackson, Knox, Lempert, Mazzoni, Romero, Shelley, Steinberg, Thomson, Vincent, Washington, and Wildman)

An act to amend Sections 39606, 39660, and 40451 of, to add Section 39617.5 to, to add Part 3 (commencing with Section 900) to Division 1 of, and to add Article 4.5 (commencing with Section 39669.5) to Chapter 3.5 of Part 2 of Division 26 of, the Health and Safety Code, relating to environmental health protection.

## LEGISLATIVE COUNSEL'S DIGEST

SB 25, Escutia. Environmental health protection: children.

(1) Existing law requires the State Air Resources Board to adopt ambient air quality standards in consideration of specified factors, including public health effects, as provided, and to specify threshold levels for health effects in listing substances determined to be toxic air contaminants. Existing law requires the Office of Environmental Health Hazard Assessment, upon request of the state board, to evaluate the health effects of and prepare recommendations regarding specified substances which may be or are emitted into the ambient air and that may be determined to be toxic air contaminants. Under existing law, the state board's request is required to be in accordance with an agreement that ensures that the office's workload in implementing these provisions will not be increased over that budgeted for the 1991-92 fiscal year, as provided.

This bill would eliminate the requirement for that agreement, and would impose specified requirements on the state board and the office generally relating to the protection of infants and children from environmental health hazards. The bill would require **the state board**, not later than December 31, 2000, to review all existing health-based ambient air quality standards to determine whether the standards adequately protect the health of the public, including infants and children, and to revise the highest priority air quality standard determined to be inadequate, not later than December 31, 2002. The bill would require **the office**, by July 1, 2001, to establish a list of up to 5 specified toxic air contaminants that may cause infants and children to be especially susceptible to illness.

The bill would require the state board to review and, as appropriate, revise any control measures adopted for those toxic air contaminants, to reduce exposure to those toxic air contaminants, as provided.

(2) Existing law requires the South Coast Air Quality Management District to notify all schools in the South Coast Air Basin whenever any federal primary ambient air quality standard is predicted to be exceeded.

This bill would also require the south coast district to notify day care centers in that basin, to the extent feasible and upon request. The bill would create a state-mandated local program by imposing new duties on the south coast district.

(3) The bill would create the Children's Environmental Health Center within the Environmental Protection Agency to, among other things, serve as chief advisor to the Secretary for Environmental Protection and to the Governor on matters within the jurisdiction of the agency relating to environmental health and environmental protection as it relates to children.

(4) This bill would incorporate additional changes to Section 40451 of the Health and Safety Code, proposed by SB 1195, to be operative only if SB 1195 and this bill are both chaptered on or before January 1, 2000, and this bill is chaptered last.

(5) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement, including the creation of a State Mandates Claims Fund to pay the costs of mandates that do not exceed \$1,000,000 statewide and other procedures for claims whose statewide costs exceed \$1,000,000.

This bill would provide that, if the Commission on State Mandates determines that the bill contains costs mandated by the state, reimbursement for those costs shall be made pursuant to these statutory provisions.

## **THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:**

### **SECTION 1. The Legislature finds and declares all of the following:**

(a) Infants and children have a higher ventilation rate than adults relative to their body weight and lung surface area, resulting in a greater dose of pollution delivered to their lungs.

(b) Children have narrower airways than adults. Thus, irritation or inflammation caused by air pollution that would produce only a slight response in an adult can result in a potentially significant obstruction of the airway in a young child.

(c) Children spend significantly more time outdoors, especially in the summer, when ozone air pollution levels are typically highest. National statistics show that children spend an average of 50 percent more time outdoors than adults.

(d) Air pollution is known to exacerbate asthma and be a trigger for asthma attacks in infants and children, 500,000 of whom are afflicted with this chronic lung disease in California.

(e) Infant's and children's developing organs and tissues are more susceptible to damage from some environmental contaminants than are adult organs and tissues.

(f) It is the intent of the Legislature in enacting this act, to require that the state's air quality standards and airborne toxic control measures be reviewed to determine if they adequately protect the health of infants and children, and that these standards and measures be revised if they are determined to be inadequate.

(g) It is also the intent of the Legislature in enacting this act to require the State Air Resources Board and the Office of Environmental Health Hazard Assessment to consider the health impacts to all populations of children, including special subpopulations of infants and children that comprise a meaningful portion of the general population, such as children with asthma, cystic fibrosis, or other respiratory conditions or diseases, in setting or revising standards pursuant to this act.

**SEC. 2. Part 3 (commencing with Section 900) is added to Division 1 of the Health and Safety Code, to read:**

**PART 3. CHILDREN'S ENVIRONMENTAL HEALTH CENTER**

900. There is hereby created the Children's Environmental Health Center within the Environmental Protection Agency. The primary purposes of the center shall include all of the following:

(a) To serve as the chief advisor to the Secretary for Environmental Protection and to the Governor on matters within the jurisdiction of the Environmental Protection Agency relating to environmental health and environmental protection as each of those matters relates to children.

(b) To assist the boards, departments, and offices within the Environmental Protection Agency to assess the effectiveness of statutes, regulations, and programs designed to protect children from environmental hazards.

(c) To coordinate within the Environmental Protection Agency and with other state agencies, regulatory efforts, research and data collection, and other programs and services that impact the environmental health of children, and coordinate with appropriate federal agencies conducting related regulatory efforts and research and data collection.

(d) In consultation with the State Air Resources Board and the Office of Environmental Health Hazard Assessment, and notwithstanding Section 7550.5 of the Government Code, to report to the Legislature and the Governor no later than December 31, 2001, on the progress of the state board and the office toward implementing the act that added this part during the 1999-2000 Regular Session and to make recommendations for any statutory or regulatory changes that may be necessary to carry out the intent of that act to protect the public health, including infants and children, from air pollutants and toxic air contaminants.

**SEC. 3. Section 39606 of the Health and Safety Code is amended to read:**

**39606.**

(a) The state board shall do both of the following:

(1) Based upon similar meteorological and geographic conditions and consideration for political boundary lines whenever practicable, divide the state into air basins to fulfill the purposes of this division.

(2) Adopt standards of ambient air quality for each air basin in consideration of the public health, safety, and welfare, including, but not limited to, health, illness, irritation to the senses, aesthetic value, interference with visibility, and effects on the economy. These standards may vary from one air basin to another. Standards relating to health effects shall be based upon the recommendations of the Office of Environmental Health Hazard Assessment.

(b) In its recommendations for submission to the state board pursuant to paragraph (2) of subdivision (a), the Office of Environmental Health Hazard Assessment, to the extent that information is available, shall assess the following:

(1) Exposure patterns, including, but not limited to, patterns determined by relevant data supplied by the state board, among infants and children that are likely to result in disproportionately high exposure to ambient air pollutants in comparison to the general population.

(2) Special susceptibility of infants and children to ambient air pollutants in comparison to the general population.

(3) The effects on infants and children of exposure to ambient air pollutants and other substances that have a common mechanism of toxicity.

(4) The interaction of multiple air pollutants on infants and children, including the interaction between criteria air pollutants and toxic air contaminants.

(c) In assessing the factors specified in subdivision (b), the office shall use current principles, practices, and methods used by public health professionals who are experienced practitioners in the field of human health effects assessment. The scientific basis or scientific portion of the method used by the office to assess the factors set forth in subdivision (b) shall be subject to peer review as described in Section 57004 or in a manner consistent with the peer review requirements of Section 57004. Any person may submit any information for consideration by the entity conducting the peer review, which may receive oral testimony.

(d) (1) No later than December 31, 2000, the state board in consultation with the office, shall review all existing health-based ambient air quality standards to determine whether, based on public health, scientific literature, and exposure pattern data, the standards adequately protect the health of the public, including infants and children, with an adequate margin of safety. The state board shall publish a report summarizing these findings.

(2) The state board shall revise the highest priority ambient air quality standard determined to be inadequate to protect infants and children with an adequate margin of safety, based on its report, no later than December 31, 2002. Following the revision of the highest priority standard, the state board shall revise any additional standards determined to be inadequate to protect infants and children with an adequate margin of safety, at the rate of at least one per year. The standards shall be established at levels that adequately protect the health of the public, including infants and children, with an adequate margin of safety.

(e) Nothing in this section shall restrict the authority of the state board to consider additional information in establishing ambient air quality standards or to adopt an ambient air quality standard designed to protect vulnerable populations other than infants and children.

**SEC. 4. Section 39617.5 is added to the Health and Safety Code, to read:**  
**39617.5.**

(a) Not later than January 1, 2003, the state board shall do all of the following:

(1) Evaluate the adequacy of the current monitoring network for its ability to gather the data necessary to determine the exposure of infants and children to air pollutants including criteria air pollutants and toxic air contaminants.

(2) Identify areas where the exposure of infants and children to air pollutants is not adequately measured by the current monitoring network.

(3) Recommend changes to improve air pollution monitoring networks and data collection to more accurately reflect the exposure of infants and children to air pollutants.

(b) In carrying out this section, the state board, in cooperation with the districts, shall expand its existing monitoring program in six communities around the state in nonattainment areas, as selected by the state board, to include special monitoring of children's exposure to air pollutants and toxic contaminants. The expanded program shall include placing air pollution monitors near schools, day care centers, and outdoor recreational facilities that are in close proximity to, or downwind from, major industrial sources of air pollutants and toxic air contaminants, including, freeways and major traffic areas. The purpose of the air pollution monitors shall be to conduct sampling of air pollution levels affecting children. Monitoring may include the use of fixed, mobile, and other monitoring devices, as appropriate.

(c) The expanded monitoring program shall include the following:



(1) Monitoring during multiple seasons and at multiple locations within each community at schools, day care centers, recreational facilities, and other locations where children spend most of their time.

(2) A combination of upgrading existing fixed monitoring sites, establishing new fixed monitoring sites, and conducting indoor and outdoor sampling and personal exposure measurements in each community to provide the most comprehensive data possible on the levels of children's exposure to air pollutants and toxic air contaminants.

(d) Data collected from expanded air quality monitoring activities conducted pursuant to this section may be used for any purpose authorized by law, including, but not limited to, determinations as to whether an area has attained or has not attained the state and national ambient air quality standards, if the monitoring devices from which the data was collected meet the monitoring requirements specified in Section 58.14 of Title 40 of the Code of Federal Regulations for special purpose monitors, all other monitoring requirements of Part 58 of Title 40 of the Code of Federal Regulations, and all applicable requirements specified in regulations adopted by the state board.

**SEC. 5. Section 39660 of the Health and Safety Code is amended to read:  
39660.**

(a) Upon the request of the state board, the office, in consultation with and with the participation of the state board, shall evaluate the health effects of and prepare recommendations regarding substances, other than pesticides in their pesticidal use, which may be or are emitted into the ambient air of California and that may be determined to be toxic air contaminants.

(b) In conducting this evaluation, the office shall consider all available scientific data, including, but not limited to, relevant data provided by the state board, the State Department of Health Services, the Occupational Safety and Health Division of the Department of Industrial Relations, the Department of Pesticide Regulation, international and federal health agencies, private industry, academic researchers, and public health and environmental organizations. The evaluation shall be performed using current principles, practices, and methods used by public health professionals who are experienced practitioners in the fields of epidemiology, human health effects assessment, risk assessment, and toxicity.

(c) (1) The evaluation shall assess the availability and quality of data on health effects, including potency, mode of action, and other relevant biological factors, of the substance, and shall, to the extent that information is available, assess all of the following:

(A) Exposure patterns among infants and children that are likely to result in disproportionately high exposure to ambient air pollutants in comparison to the general population.

(B) Special susceptibility of infants and children to ambient air pollutants in comparison to the general population.

(C) The effects on infants and children of exposure to toxic air contaminants and other substances that have a common mechanism of toxicity.

(D) The interaction of multiple air pollutants on infants and children, including the interaction between criteria air pollutants and toxic air contaminants.

(2) The evaluation shall also contain an estimate of the levels of exposure that may cause or contribute to adverse health effects. If it can be established that a threshold of adverse health effects exists, the estimate shall include both of the following factors:

(A) The exposure level below which no adverse health effects are anticipated.

(B) An ample margin of safety that accounts for the variable effects that heterogeneous human populations exposed to the substance under evaluation may experience, the uncertainties associated with the applicability of the data to human beings, and the completeness and quality of

the information available on potential human exposure to the substance. In cases in which there is no threshold of significant adverse health effects, the office shall determine the range of risk to humans resulting from current or anticipated exposure to the substance.

(3) The scientific basis or scientific portion of the method used by the office to assess the factors set forth in this subdivision shall be reviewed in a manner consistent with this chapter by the Scientific Review Panel on Toxic Air Contaminants established pursuant to Article 5 (commencing with Section 39670). Any person may submit any information for consideration by the panel, which may receive oral testimony.

(d) The office shall submit its written evaluation and recommendations to the state board within 90 days after receiving the request of the state board pursuant to subdivision (a). The office may, however, petition the state board for an extension of the deadline, not to exceed 30 days, setting forth its statement of the reasons that prevent the office from completing its evaluation and recommendations within 90 days. Upon receipt of a request for extension of, or noncompliance with, the deadline contained in this section, the state board shall immediately transmit to the Assembly Committee on Rules and the Senate Committee on Rules, for transmittal to the appropriate standing, select, or joint committee of the Legislature, a statement of reasons for extension of the deadline, along with copies of the office's statement of reasons that prevent it from completing its evaluation and recommendations in a timely manner.

(e) (1) The state board or a district may request, and any person shall provide, information on any substance that is or may be under evaluation and that is manufactured, distributed, emitted, or used by the person of whom the request is made, in order to carry out its responsibilities pursuant to this chapter. To the extent practical, the state board or a district may collect the information in aggregate form or in any other manner designed to protect trade secrets.

(2) Any person providing information pursuant to this subdivision may, at the time of submission, identify a portion of the information submitted to the state board or a district as a trade secret and shall support the claim of a trade secret, upon the written request of the state board or district board. Subject to Section 1060 of the Evidence Code, information supplied that is a trade secret, as specified in Section 6254.7 of the Government Code, and that is so marked at the time of submission, shall not be released to any member of the public. This section does not prohibit the exchange of properly designated trade secrets between public agencies when those trade secrets are relevant and necessary to the exercise of their jurisdiction if the public agencies exchanging those trade secrets preserve the protections afforded that information by this paragraph.

(3) Any information not identified as a trade secret shall be available to the public unless exempted from disclosure by other provisions of law. The fact that information is claimed to be a trade secret is public information. Upon receipt of a request for the release of information that has been claimed to be a trade secret, the state board or district shall immediately notify the person who submitted the information, and shall determine whether or not the information claimed to be a trade secret is to be released to the public. The state board or district board, as the case may be, shall make its determination within 60 days after receiving the request for disclosure, but not before 30 days following the notification of the person who submitted the information. If the state board or district decides to make the information public, it shall provide the person who submitted the information 10 days' notice prior to public disclosure of the information.

(f) The office and the state board shall give priority to the evaluation and regulation of substances based on factors related to the risk of harm to public health, amount or potential amount of emissions, manner of, and exposure to, usage of the substance in California, persistence in the atmosphere, and ambient concentrations in the community. In determining the importance of these

factors, the office and the state board shall consider all of the following information, to the extent that it is available:

(1) Research and monitoring data collected by the state board and the districts pursuant to Sections 39607, 39617.5, 39701, and 40715, and by the United States Environmental Protection Agency pursuant to paragraph (2) of subsection (k) of Section 112 of the federal act (42 U.S.C. Sec. 7412(k)(2)).

(2) Emissions inventory data reported for substances subject to Part 6 (commencing with Section 44300) and the risk assessments prepared for those substances.

(3) Toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (42 U.S.C. Sec. 11023) and Section 6607 of the Pollution Prevention Act of 1990 (42 U.S.C. Sec. 13106).

(4) Information on estimated actual exposures to substances based on geographic and demographic data and on data derived from analytical methods that measure the dispersion and concentrations of substances in ambient air.

**SEC. 6. Article 4.5 (commencing with Section 39669.5) is added to Chapter 3.5 of Part 2 of Division 26 of the Health and Safety Code, to read:**

**Article 4.5. Special Provisions For Infants And Children**

**39669.5.** The Legislature finds and declares that certain toxic air contaminants may pose risks that cause infants and children to be especially susceptible to illness and that certain actions are necessary to ensure their safety from toxic air contaminants.

(a) By July 1, 2001, the following shall occur:

(1) The office, in consultation with the state board, shall establish a list of up to five toxic air contaminants identified or designated by the state board pursuant to Section 39657 that may cause infants and children to be especially susceptible to illness. In developing the list, the office shall take into account public exposures to toxic air contaminants, whether by themselves or interacting with other toxic air contaminants or criteria pollutants, and the factors listed in subdivision (c) of Section 39660. The office shall submit a report containing the list and its reasons for including the toxic air contaminants on the list to the Scientific Review Panel on Toxic Air Contaminants established pursuant to Article 5 (commencing with Section 39670).

(2) The scientific review panel, in a manner consistent with this chapter, shall review the list of toxic air contaminants submitted by the office pursuant to paragraph (1). As part of the review, any person may submit any information for consideration by the panel, which may receive oral testimony.

(b) (1) Within two years of the establishment of the list required pursuant to subdivision (a), the state board shall review and, as appropriate, revise any control measures adopted for the toxic air contaminants identified on the list, to reduce exposure to those toxic air contaminants pursuant to Article 4 (commencing with Section 39665), to protect public health, and particularly infants and children.

(2) Within three years of the establishment of the list required pursuant to subdivision (a), for up to five of those toxic air contaminants for which no control measures have been previously adopted, the state board shall prepare a report on the need for regulations, following the procedure specified in Section 39665. The state board shall adopt within that same three-year timeframe, as appropriate, any new control measures to reduce exposure to those toxic air contaminants pursuant to Article 4 (commencing with Section 39665), to protect public health, particularly infants and children.

(c) Beginning July 1, 2004, the office shall annually evaluate at least 15 toxic air contaminants identified or designated by the state board pursuant to Section 39657, and provide threshold exposure levels and nonthreshold health values, as appropriate, for those toxic air contaminants. The activities required pursuant to this subdivision shall continue until all toxic air contaminants are evaluated. The levels shall be established pursuant to the procedures adopted for health and risk assessments pursuant to paragraph (2) of subdivision (b) of Section 44360, and taking into account the factors listed in subdivision (c) of Section 39660. Based on this evaluation, and after review by the scientific review panel as prescribed in paragraph (2) of subdivision (a), the office shall update the list established pursuant to subdivision (a), by July 1, 2005, and each year thereafter. Within three years of the initial or subsequent listing update, for up to five of the toxic air contaminants contained on that list for which no control measures have been previously adopted, or for at least five of the toxic air contaminants if more than five toxic air contaminants have been identified, the state board shall prepare a report on the need for regulation, following the procedure specified in Section 39665. The state board shall adopt within that three-year timeframe, as appropriate, new control measures, pursuant to Article 4 (commencing with Section 39665), to reduce exposure to those toxic air contaminants, to protect public health, and particularly infants and children.

(d) Toxic air contaminants evaluated and listed pursuant to this section shall not include substances in those uses that are not subject to regulation by the state board pursuant to this chapter.

**SEC. 7. Section 40451 of the Health and Safety Code is amended to read:**

**40451.**

(a) The south coast district shall use the Pollutant Standards Index developed by the Environmental Protection Agency and shall report and forecast pollutant levels daily for dissemination in the print and electronic media.

(b) Using existing communication facilities available to it, the south coast district shall notify all schools and, to the extent feasible and upon request, daycare centers in the South Coast Air Basin whenever any federal primary ambient air quality standard is predicted to be exceeded.

(c) Whenever it becomes available, the south coast district shall disseminate to schools, amateur adult and youth athletic organizations, and all public agencies operating parks and recreational facilities in the south coast district the latest scientific information and evidence regarding the need to restrict exercise and other outdoor activities during periods when federal primary air quality standards are exceeded.

(d) Once every two months and annually, the south coast district shall report on the number of days and locations that federal and state ambient air quality standards were exceeded and the number of days and locations of these occurrences.

**SEC. 7.5. Section 40451 of the Health and Safety Code is amended to read:**

**40451.**

(a) The south coast district shall use the Pollutant Standards Index developed by the United States Environmental Protection Agency and shall report and forecast pollutant levels daily for dissemination in the print and electronic media.

Commencing July 1, 2001, the south coast district shall also include in its report and forecast levels of PM<sub>2.5</sub> in excess of the 24-hour federal ambient air standard, as adopted in July 1997, or any standard adopted by the United States Environmental Protection Agency that succeeds that standard.

(b) Using existing communication facilities available to it, the south coast district shall notify all schools and, to the extent feasible and upon request, daycare centers in the South Coast Air Basin whenever any federal primary ambient air quality standard is predicted to be exceeded. Commencing July 1, 2001, using communication facilities available to it, the south coast district shall also notify all schools in the South Coast Air Basin when the ambient level of PM<sub>2.5</sub> is predicted to exceed the 24-hour federal ambient air standard, as adopted in July 1997, or any standard adopted by the United States Environmental Protection Agency that succeeds that standard.

(c) Whenever it becomes available, the south coast district shall disseminate to schools, amateur adult and youth athletic organizations, and all public agencies operating parks and recreational facilities in the south coast district the latest scientific information and evidence regarding the need to restrict exercise and other outdoor activities during periods when federal primary air quality standards and the 24-hour federal ambient air standard for PM<sub>2.5</sub>, as adopted in July 1997, or any standards adopted by the United States Environmental Protection Agency that succeed those standards, are exceeded.

(d) Once every two months and annually, the south coast district shall report on the number of days and locations that federal and state ambient air quality standards were exceeded. Commencing July 1, 2001, the south coast district shall also include in that report the number of days and locations on and at which the 24-hour federal ambient air standard for PM<sub>2.5</sub>, as adopted in July 1997, or any standard adopted by the United States Environmental Protection Agency that succeeds that standard, is exceeded.

**SEC. 8. Section 7.5 of this bill incorporates amendments to Section 40451 of the Health and Safety Code proposed by both this bill and SB 1195.**

It shall only become operative if:

...(1) both bills are enacted and become effective on or before January 1, 2000, (2) each bill amends Section 40451 of the Health and Safety Code, and (3) this bill is enacted after SB 1195, in which case Section 7 of this bill shall not become operative.

**SEC. 9. Notwithstanding Section 17610 of the Government Code**, if the Commission on State Mandates determines that this act contains costs mandated by the state, reimbursement to local agencies and school districts for those costs shall be made pursuant to Part 7 (commencing with Section 17500) of Division 4 of Title 2 of the Government Code. If the statewide cost of the claim for reimbursement does not exceed one million dollars (\$1,000,000), reimbursement shall be made from the State Mandates Claims Fund.

**B. Assembly Bill 2872** (CHAPTER 144, STATUTES OF 2000)

FILED WITH SECRETARY OF STATE JULY 19, 2000

APPROVED BY GOVERNOR JULY 19, 2000

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PASSED THE ASSEMBLY JULY 6, 2000

INTRODUCED BY Assembly Member Shelley

(Coauthors: Assembly Members Alquist, Aroner, Corbett, Davis, Gallegos, Hertzberg, Honda, Keeley, Knox, Kuehl, Lempert, Longville, Lowenthal, Mazzoni, Romero, Scott, Steinberg, Strom-Martin, Torlakson, Villaraigosa, Wiggins, and Wildman)

(Coauthors: Senators Alarcon, Bowen, Escutia, Murray, Ortiz, Perata, Polanco, and Solis)

An act to amend Section 7715 of the Fish and Game Code, to add and repeal Part 3 (commencing with Section 1101) of Division 1 of the Food and Agricultural Code, to amend Sections 25404, 25404.1, 25404.3, 25404.4, 25404.5, and 25404.6 of, to add Sections 901 and 39619.6 to, to add Article 8.5 (commencing with Section 25395.20) to Chapter 6.8 of Division 20 of, and to add and repeal Section 25299.50.1 of, the Health and Safety Code, and to add Sections 13177.5 and 13177.6 to the Water Code, relating to resources and environmental protection, making an appropriation therefor, and declaring the urgency thereof, to take effect immediately.

**LEGISLATIVE COUNSEL'S DIGEST**

AB 2872, Shelley. Resources and environmental protection: biomass facility grant program: (2) cancer risk assessment guidelines: underground storage tanks: hazardous material loan program: fire safety: CUPA's: (6) health conditions in portable classrooms: fish monitoring.

(2) Existing law establishes various cancer research, screening, and treatment programs.

This bill would require the Office of Environmental Health Hazard Assessment to evaluate and update cancer risk assessment guidelines with respect to the fetus, infants, and children. It would, in accordance with a prescribed timeline, require that office to take specific actions in this regard.

The bill would also require the Children's Environmental Health Center established in the Office of the Secretary of Environmental Protection to report to the Legislature and the Governor on the implementation of these provisions.

(6) Existing law provides for the State Air Resources Board in state government and assigns the state board various duties concerning air resources.

This bill would require the state board and the State Department of Health Services, in consultation with the State Department of Education, the Department of General Services, and the Office of Environmental Health Hazard Assessment to conduct a comprehensive study and review of the environmental health conditions in portable classrooms. The report would be required to address specified issues, be completed by June 30, 2002, and be provided to appropriate policy committees of the Legislature.

**THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:****SEC. 2. Section 901 is added to the Health and Safety Code, to read:****901.**

(a) As used in this section:

(1) "Center" means the Children's Environmental Health Center established pursuant to Section 900.

(2) "Office" means the Office of Environmental Health Hazard Assessment.

(b) On or before June 30, 2001, the office shall review cancer risk assessment guidelines for use by the office and the other entities within the California Environmental Protection Agency to establish cancer potency values or numerical health guidance values that adequately address carcinogenic exposures to the fetus, infants, and children.

(c) The evaluation and update required by subdivision (b) shall include a review of existing state and federal cancer risk guidelines, as well as new information on carcinogenesis, and shall consider the extent to which those guidelines address risks from exposures occurring early in life.

(d) The evaluation and update required by subdivision (b) shall also include, but not be limited to, all of the following:

(1) The development of criteria for identifying carcinogens likely to have a greater impact if exposures occur early in life.

(2) The assessment of methodologies used in existing guidelines to address early-in-life exposures.

(3) The construction of a data base of animal studies to evaluate increases in risks from short-term early-in-life exposures.

(e) On or before June 30, 2004, the office shall finalize and publish children's cancer guidelines that shall be protective of children's health. These guidelines shall be revised and updated as needed by the office.

(f) (1) On or before December 31, 2002, the office shall publish a guidance document, for use by the Department of Toxic Substances Control and other state and local environmental and public health agencies, to assess exposures and health risks at existing and proposed school sites. The guidance document shall include, but not be limited to, all of the following:

(A) Appropriate child-specific routes of exposure unique to the school environment, in addition to those in existing exposure assessment models.

(B) Appropriate available child-specific numerical health effects guidance values, and plans for the development of additional child-specific numerical health effects guidance values.

(C) The identification of uncertainties in the risk assessment guidance, and those actions that should be taken to address those uncertainties.

(2) The office shall consult with the Department of Toxic Substances Control and the State Department of Education in the preparation of the guidance document required by paragraph (1) in order to ensure that it provides the information necessary for these two agencies to meet the requirements of Sections 17210.1 and 17213.1 of the Education Code.

(g) On or before January 1, 2002, the office, in consultation with the appropriate entities within the California Environmental Protection Agency, shall identify those chemical contaminants commonly found at school sites and determined by the office to be of greatest concern based on criteria that identify child-specific exposures and child-specific physiological sensitivities. On or before December 31, 2002, and annually thereafter, the office shall publish and make available to the public and to other state and local environmental and public health agencies and school districts, numerical health

guidance values for five of those chemical contaminants identified pursuant to this subdivision until the contaminants identified have been exhausted.

(h) On and after January 1, 2002, and biannually thereafter, the center shall report to the Legislature and the Governor on the implementation of this section as part of the report required by subdivision (d) of Section 900. The report shall include, but not be limited to, information on revisions or modifications made by the office and other entities within the California Environmental Protection Agency to cancer potency values and other numerical health guidance values in order to be protective of children's health. The report shall also describe the use of the revised health guidance values in the programs and activities of the office and the other boards and departments within the California Environmental Protection Agency.

(i) Nothing in this section shall relieve any entity within the California Environmental Protection Agency of complying with Chapter 3.5 (commencing with Section 11340) of Part 2 of Division 3 Title 2 of the Government Code, to the extent that chapter is applicable to the entity on or before the effective date of this section, as added during the 2000 portion of the 1999-2000 Regular Session, or Section 57004 of the Health and Safety Code.

**SEC. 11. Section 39619.6 is added to the Health and Safety Code, to read:**

**39619.6.** By June 30, 2002, the state board and the StateDepartment of Health Services, in consultation with the StateDepartment of Education, the Department of General Services, and theOffice of Environmental Health Hazard Assessment, shall conduct a comprehensive study and review of the environmental health conditions in portable classrooms, as defined in subdivision (k) of Section17070.15 of the Education Code.

(b) The state board and the department shall jointly coordinatethe study, oversee data analysis and quality assurance, coordinatestakeholder participation, and prepare recommendations. The stateboard shall develop and oversee the contract for field work, air monitoring and data analysis, and obtain equipment for the study. The department shall oversee the assessment of ventilation systems and practices and the evaluation of microbiological contaminants, and may provide laboratory analyses as needed.

(c) By August 31,2000, the state board shall release a request for proposals for the field portion of the study. Field work shall begin not later than July, 2001. The final report shall be completed on or before June 30, 2002, and shall be provided to the appropriate policy committees of the Legislature. The study of portable classrooms shall include all of the following":

- (1) Review of design and construction specifications, inclding those for ventilation systems.
- (2) Review of school maintenance practices, including the actual operation or nonoperation of ventilation systems.
- (3) Assessment of indoor air quality.
- (4) Assessment of potential toxic contamination, including molds and other biological contaminants.

(d) The final report shall summarize the results of the study and review, and shall include recommendations to remedy and prevent unhealthful conditions found in portable classrooms, including the need for all of the following:

- (1) Modified design and construction standards, including ventilation specifications.
- (2) Emission limits for building materials and classroom furnishings.
- (3) Other mitigation actions to ensure the protection of children's health.



## C. LIST OF ACRONYMS

AQAC	Air Quality Advisory Committee
ARB	California Air Resources Board
ATCM	Air Toxic Control Measure
BAAQMD	Bay Area Quality Management District
BACT	Best Available Control Technology
CAAQS	California Ambient Air Quality Standards
Cal/EPA	California Environmental Protection Agency
CAP	Criteria Air Pollutants
CCA	Copper-Chromate-Arsenic
CEHC	Children's Environmental Health Center
CHPS	Collaborative for High Performance Schools
CIWMB	California Integrated Waste Management Board
CREL	Chronic Reference Exposure Levels
DHS	California Department of Health Services
DPR	Department of Pesticide Regulation
DRP	Diesel-vehicle Related Pollutants
DTSC	Department of Toxic Substances Control
ECOS	Environmental Council of the States
ETS	Environmental Tobacco Smoke
FACES	Fresno Asthmatic Children's Environment Study
HELPR	Health and Environmental LookuP Resource
HERD	Human and Ecological Risk Division
ICAT	Innovative Clean Air Technologies
IPM	Integrated Pest Management
MMRA	Multimedia, Multi-Pathway Risk Assessment
NIEHS	National Institute of Environmental Health Sciences
OEHHA	Office of Environmental Health Hazard Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PCDD	Polychlorinated Dibenzo-p-dioxins
PCDF	Polychlorinated Dibenzofurans
PEA	Preliminary Environmental Assessment
PM	Particulate Matter
POM	Polycyclic Organic Matter
RAW	Removal Action Workplan
REL	Reference Exposure Levels
SEAM	School Evaluation and Assessment Manual
TAC	Toxic Air Contaminants
TRU	Transport Refrigeration Unit
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds